

4.4 เอกสารสอบเทียบเครื่องมือ
(บริษัท เอ็มเม็กซ์ แอสโซซิเอชั่น จำกัด ทะเบียนเลขที่ ว-244)

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



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เลขทะเบียน ว-244

Certificate of System Qualification

GC-OQ

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

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

System Inspection and Basic Safety and Operation

Name: 7890
Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Decay

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

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890
Front SSL

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



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Setpoint Status: Pass

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

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 7890

Front FID

Setpoint Status: Pass

Flow Type: Fuel

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

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

Setpoint Status: Pass

Flow Type: Oxidizer

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

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

Setpoint Status: Pass

Flow Type: Makeup

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

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

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Overall Detector Flow Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature:	230.0	231.2	°C
Accuracy:			1.2
Agilent Recommended:			>= -1.0
			<= 1.0

% setpoint in K (-5.0 °C)
(5.0 °C)

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature:	100.0	100.2	°C
Accuracy:			0.2
Agilent Recommended:			>= -1.0
			<= 1.0

% setpoint in K (-3.7 °C)
(3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average

Temperature:	100.0	100.25	°C
Stability:			0.1
Agilent Recommended:			<= 0.5

Overall GC Oven Temperature Stability Test Status

Pass

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Scouting Run

Tested Combination1 Front SSL / Front FID

Injection Tower

Name: 7693A

Setpoint Status: Completed

Injection Volume on Column: 1.0 uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination1 Front SSL / Front FID

Name: 7890

Setpoint Status: Pass

Base Signal: 14.4 pA

ASTM Noise

Drift

pA

pA/Hr

0.06

1.38

Agilent Recommended: <= 0.10 <= 2.50

Status: Pass Pass

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination1 Front SSL / Front FID

Name: 7693A

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System ID: GC_FID_CN12211142EMEX Environmental
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Setpoint Status: Pass

Injection Volume on Column: 1.0 uL

Area RSD: 0.23 % Retention Time RSD: 0.33 %

Agilent Recommended: <= 3.00 <= 1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination1 Front SSL / Front FID

Injection Tower

Name: 7890

Setpoint Status: Pass

Signal to Noise: 657777

Agilent Recommended: >= 300000

Overall Signal to Noise Test Status

Pass

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Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

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

Tested Combination1

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

Sampler 1

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



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Sampler 2

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

Mainframe 1

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

Inlet 1

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

Detector 1

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



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

Electronic Signature

Purpose

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Details

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

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เลขทะเบียน ว-244

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

User Name: sulkifli.mama
Report Generated by Hostname: AG-5CG2030XXV
System ID: GC_FID_CN12211142
Print Date: September 12, 2023 1:49:33 PM

6066184127_Emex_OQGC_CN12211142 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 12, 2023 10:26:17 AM	Audit	SessionCreated	Session	None
September 12, 2023 10:26:17 AM	Start	Configuration	Session	None
September 12, 2023 10:26:17 AM	Audit	Entitlement	Licensing	User is FieldEngineer and does not require an unlock code
September 12, 2023 10:48:01 AM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.51/Gc.02.51.eqp], EQP File Name: [Gc.02.51.eqp], EQP Name: [AgilentRecommended]Protocol Revision [Gc.02.51]
September 12, 2023 10:46:08 AM	End	Configuration	Session	None
September 12, 2023 10:46:13 AM	Start	Qualification	Session	OQ
September 12, 2023 10:46:13 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
September 12, 2023 10:48:07 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1
September 12, 2023 10:48:10 AM	Start	Execution	Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >=-2.0 psi and <= 0.5 psi	None



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

User Name: sulkiifi.mama
Report Generated by Hostname: AG-5CG2030XXV

System Id: GC_FID_CN12211142
Print Date: September 12, 2023 1:49:33 PM

6006184127_Emex_OQGC_CN12211142 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 12, 2023 10:48:33 AM	End	Execution	Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	Run Count : 1
September 12, 2023 10:48:40 AM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
September 12, 2023 10:48:54 AM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
September 12, 2023 10:49:01 AM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None
September 12, 2023 10:49:36 AM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
September 12, 2023 10:49:38 AM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
September 12, 2023 10:50:28 AM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
September 12, 2023 10:51:08 AM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
September 12, 2023 10:51:11 AM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
September 12, 2023 10:52:15 AM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None

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User Name: sulkiifi.mama
Report Generated by Hostname: AG-5CG2030XXV

System Id: GC_FID_CN12211142
Print Date: September 12, 2023 1:49:33 PM

6006184127_Emex_OQGC_CN12211142 Transaction log :

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

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

User Name: sulikilimama
Report Generated by Hostname: AG-5CG2030XXV

System Id: GC_FID_CN12211142
Print Date: September 12, 2023 1:49:33 PM

6006184127_Emex_OQGC_CN12211142 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 12, 2023 11:40:11 AM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
September 12, 2023 11:40:13 AM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
September 12, 2023 1:22:16 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
September 12, 2023 1:27:32 PM	Audit	AcceClosed	Session	None
September 12, 2023 1:28:55 PM	Audit	AcceRestarted	Session	None
September 12, 2023 1:28:56 PM	Audit	SessionReloaded	Session	None
September 12, 2023 1:29:01 PM	Start	Qualification	Session	OQ
September 12, 2023 1:29:01 PM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
September 12, 2023 1:31:01 PM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Data files Path : F:\Data\EMEX\OQ2023_GC-FID 2023-09-12 12-06-24\SC.D\FID1A.ch
September 12, 2023 1:31:48 PM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Run Count : 1

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User Name: sulikilimama
Report Generated by Hostname: AG-5CG2030XXV

System Id: GC_FID_CN12211142
Print Date: September 12, 2023 1:49:33 PM

6006184127_Emex_OQGC_CN12211142 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 12, 2023 1:31:51 PM	Start	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
September 12, 2023 1:32:09 PM	Audit	Data	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : F:\Data\EMEX\OQ2023_GC-FID 2023-09-12 12-06-24\ND_02.D\FID1A.ch
September 12, 2023 1:32:40 PM	End	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1
September 12, 2023 1:32:49 PM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
September 12, 2023 1:33:08 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\Data\EMEX\OQ2023_GC-FID 2023-09-12 12-06-24\IP_2.D\FID1A.ch
September 12, 2023 1:33:08 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\Data\EMEX\OQ2023_GC-FID 2023-09-12 12-06-24\IP_3.D\FID1A.ch
September 12, 2023 1:33:08 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\Data\EMEX\OQ2023_GC-FID 2023-09-12 12-06-24\IP_4.D\FID1A.ch
September 12, 2023 1:33:08 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\Data\EMEX\OQ2023_GC-FID 2023-09-12 12-06-24\IP_5.D\FID1A.ch

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

User Name: suikfili.mama

Report Generated by Hostname: AG-5CG2030XXV

System ID: GC_FID_CN12211142

Print Date: September 12 2023 1 40:33 PM

6006184127_Emex_OQGC_CN12211142 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
September 12, 2023 1:33:08 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\Data\EMEX\OQ2023_GC- FID 2023-09-12 12-06-24\IP_6.D\FID1A.ch
September 12, 2023 1:33:08 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : F:\Data\EMEX\OQ2023_GC- FID 2023-09-12 12-06-24\IP_7.D\FID1A.ch
September 12, 2023 1:33:32 PM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1
September 12, 2023 1:33:42 PM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	None
September 12, 2023 1:33:54 PM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Data files Path : F:\Data\EMEX\OQ2023_GC- FID 2023-09-12 12-06-24\SN.D\FID1A.ch
September 12, 2023 1:34:27 PM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Run Count : 1
September 12, 2023 1:34:50 PM	End	Qualification	Session	OQ
September 12, 2023 1:34:50 PM	Start	Reporting	Session	None
September 12, 2023 1:48:10 PM	Audit	Reporting	Session	Report Generated : Certificate
September 12, 2023 1:48:36 PM	Audit	Reporting	Session	Report Generated : Report

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System ID: GC_FID_CN12211142