

ภาคผนวก จ

ใบรับรองการสอบเทียบเครื่องมือ



right solutions.
right partner.

รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Ambient	Toluene	GC-MSD	RYG_EN0136	7-Jul-22	7-Jan-24	18
Ambient	Formaldehyde	Field Rotameter	BKK_FS1006	1-Jul-23	1-Oct-23	3
Ambient	Formaldehyde	Field Rotameter	RYG_FS0199	2-Oct-23	2-Jan-24	3
Ambient	Formaldehyde	Field Rotameter	BKK_FS1006	2-Oct-23	2-Jan-24	3
Ambient	Formaldehyde	GC-FID	BKK_EN0126	21-Apr-23	21-Oct-24	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0087	19-Jan-23	19-Jul-24	18
Stack	Formaldehyde	Pitot Tube	RYG_FS0320	13-Jul-23	13-Jan-24	6
Stack	Formaldehyde	Flue gas Analyzer	RYG_FS0464	23-Jan-23	23-Jan-24	12
Stack	Formaldehyde	Field Rotameter	RYG_FS0197	2-Oct-23	2-Jan-24	3
Stack	Formaldehyde	Field Rotameter	RYG_FS0655	2-Oct-23	2-Jan-24	3
Stack	Formaldehyde	GC-FID	BKK_EN0126	21-Apr-23	21-Oct-24	18
Noise	Leq 24 hrs	Sound Calibrator	RYG_FS0213	26-Jan-23	26-Jan-24	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0495	13-Jan-23	13-Jan-24	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0031	10-Aug-23	10-Aug-24	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0302	10-Aug-23	10-Aug-24	12
Workplace	Formaldehyde	Field Rotameter	BKK_FS1006	2-Oct-23	2-Jan-24	3
Workplace	Formaldehyde	GC-FID	BKK_EN0126	21-Apr-23	21-Oct-24	18
Workplace	Toluene	Field Rotameter	BKK_FS1006	2-Oct-23	2-Jan-24	3
Workplace	Toluene	GC-MSD	BKK_EN0119	18-Apr-23	18-Oct-24	18
Noise	Leq 12 hrs	Sound Calibrator	RYG_FS0213	26-Jan-23	26-Jan-24	12
Noise	Leq 12 hrs	Sound Level Meter	RYG_FS0007	13-Jan-23	13-Jan-24	12
Noise	Leq 12 hrs	Sound Level Meter	RYG_FS0018	3-Jan-23	3-Jan-24	12
Noise	Noise Dose, TWA	Dose Badge Reader	RYG_FS0440	5-Jan-23	5-Jan-24	12
Rayong Lab	Formaldehyde	SPECTROPHOTOMETER	RYG_EN0037	18-Sep-23	18-Mar-25	18
Rayong Lab	pH at 25 °C	pH Meter	RYG_EN0152	22-Dec-22	22-Dec-23	12
Rayong Lab	BOD	DO meter with Sensor	RYG_EN0032	24-Jul-23	24-Jan-25	18
Rayong Lab	BOD	Incubator	RYG_EN0154	29-May-23	29-Nov-24	18
Rayong Lab	COD	Spectrophotometer	RYG_EN0037	18-Sep-23	18-Mar-25	18
Rayong Lab	Total Suspended Solids	Electronic Balance	RYG_EN0002	1-Mar-23	1-Mar-24	12
Rayong Lab	Total Suspended Solids	Hot Air Oven	RYG_EN0010	20-Oct-22	20-Apr-24	18
Rayong Lab	Total Dissolved Solids 180°C	Electronic Balance	RYG_EN0002	1-Mar-23	1-Mar-24	12
Rayong Lab	Total Dissolved Solids 180°C	Hot Air Oven	RYG_EN0010	20-Oct-22	20-Apr-24	18
Rayong Lab	Oil & Grease	Electronic Balance	RYG_EN0002	1-Mar-23	1-Mar-24	12
Rayong Lab	Oil & Grease	Hot Air Oven	RYG_EN0006	20-Oct-22	20-Apr-24	18
Rayong Lab	Oil & Grease	Water Bath	RYG_EN0061	20-Oct-22	20-Apr-24	18
Rayong Lab	Total Kjeldahl Nitrogen	Block Digestion Unit	RYG_EN0188	15-Mar-23	15-Mar-24	12
Rayong Lab	Total Kjeldahl Nitrogen	pH Meter	RYG_EN0152	22-Dec-22	22-Dec-23	12
Water Lab	Methanol	Gas Chromatography	BKK_EN0041	26-Jun-23	26-Dec-24	18
Water Lab	Toluene	Gas Chromatography (MSD)	BKK_EN0059	21-Jun-22	21-Dec-23	18

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: RYG_EN0136
Organization Name: ALS Laboratory Group (Thailand) Co Ltd.
Organization Location: 616/10 Moo 5, Tambol Mae Nam Koo, A.Pluakdaeng, Rayong, 21140, Thailand
Date: July 7, 2022 11:27:53 AM
EQP Name: AgilentRecommended , AgilentRecommended
EQP Revision: GC.02.52, GCMS.02.52
Overall Qualification Status: Pass

REVIEW BY N. Banniy
APPROVED BY [Signature]
NEXT CAL. DATE 07/01/24

CDS Logon Verification - GC

Logon: dej.changchon

Overall CDS Logon Verification - GC Test 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 Accuracy

Name: 7890

Front SSL

Setpoint Status: Pass

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

Date: July 7, 2022 11:27:53 AM
System ID: RYG_EN0136

Overall Inlet Pressure Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 230.6 °C

Accuracy: 0.6 °C

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

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 100.0 99.9 °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: 7890

Setpoint Status: Pass

Setpoint/Average

Temperature: 100.0 99.91667 °C

Stability: 0.1 °C

Agilent Recommended: ≤ 0.5

Overall GC Oven Temperature Stability Test Status

Pass

Log Amp

Tested Combination1	Front	SSL	/ External	SQ
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Name:	5977B			
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Setpoint Status:	Pass			
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Overall Log Amp Test Status

Pass

RFPA

Tested Combination1	Front	SSL	/ External	SQ
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Name:	5977B			
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Setpoint Status:	Pass			
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Amu:	1050	m/z
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Drift After Five Minutes:

RFPA Voltage:

	-1	mV		479	mV
Agilent Recommended:	>=	-100	and	<=	100
				<=	1100

Overall RFPA Test Status

Pass

Tune EI

Tested Combination1	Front	SSL	/ External	SQ
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Name:	5977B			
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Setpoint Status:	Pass			
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Filament:	1
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Setpoint Status:	Pass			
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Filament:	2
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Overall Tune EI Test Status

Pass

Signal to Noise EI

Date:	July 7, 2022 11:27:53 AM
System ID:	RYG_EN0136

Tested Combination1	Front	SSL	/ External	SQ
Name:	5977B			

Source:	El - Extractor	Filament:	1
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Setpoint Status:	Pass
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Signal to Noise:	7485
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Agilent Recommended:	>= 1200
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Source:	El - Extractor	Filament:	2
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Setpoint Status:	Pass
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Signal to Noise:	2097
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Agilent Recommended:	>= 1200
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This test's 2 comment(s) and 7 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	RYG_EN0136
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

Tested Combination1

Injection Technique	Manual Injection
Inlet	Front
Detector	External
LTM Included?	No

Sampler 1

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

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3442B
Serial Number	CN16463238
Firmware Revision	B.02.04.3
Component ID/Asset No.	081117000236
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	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5977B
Serial Number	US1701M008
Firmware Revision	5977 6.00.34
High Vacuum System	Turbo Pump
Scouting Run Standard	OFN Std
Component ID/Asset No.	081117000236

MS EI Source 1

Manufacturer	Agilent Technologies
Source Type	EI - Extractor
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 logon 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:	Eaknarin Puangsopa
Logged On User Name:	eaknarin_puangsopa@agilent.com
Signature Creation Date:	July 7, 2022
Reason for Signature:	Executed protocol and published this original version of document

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Date:	July 7, 2022 11:27:53 AM
System ID:	RYG_EN0136

User Name: eaknarin_puangsoa
 Hostname: ASRYGW7002

System Id: RYG_EN0136
 Print Date: July 7, 2022 11:27:56 AM

ALS_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 6, 2022 1:11:54 PM	Audit	SessionCreated	Session	None
July 6, 2022 1:11:54 PM	Start	Configuration	Session	None
July 6, 2022 1:11:54 PM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
July 6, 2022 1:17:19 PM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.52/Gc.02.52.eqp], EQP File Name: [Gc.02.52.eqp], EQP Name: [AgilentRecommended] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.52/GcMs.02.52.eqp], EQP File Name: [GcMs.02.52.eqp], EQP Name: [AgilentRecommended]
July 6, 2022 1:17:25 PM	End	Configuration	Session	None
July 6, 2022 1:17:29 PM	Start	Qualification	Session	OQ
July 6, 2022 1:17:30 PM	Start	Execution	CDS Logon Verification - GC : - Qualitative test	None
July 6, 2022 1:19:43 PM	End	Execution	CDS Logon Verification - GC : - Qualitative test	Run Count : 1
July 6, 2022 1:19:46 PM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None

User Name: eaknarin_puangsoa
 Hostname: ASRYGW7002

System Id: RYG_EN0136
 Print Date: July 7, 2022 11:27:56 AM

ALS_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 6, 2022 1:19:59 PM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1
July 6, 2022 1:20:15 PM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
July 6, 2022 1:21:43 PM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
July 6, 2022 1:21:45 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
July 6, 2022 1:25:12 PM	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
July 6, 2022 1:25:15 PM	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
July 6, 2022 1:25:17 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
July 6, 2022 1:25:32 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
July 6, 2022 1:33:42 PM	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

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User Name: eaknarin_puangsoa
 Hostname: ASRYGW7002

System Id: RYG_EN0136
 Print Date: July 7, 2022 11:27:56 AM

ALS_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 6, 2022 1:33:43 PM	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
July 6, 2022 1:33:45 PM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
July 6, 2022 1:53:05 PM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
July 6, 2022 1:53:07 PM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
July 6, 2022 1:53:11 PM	Start	Execution	Log Amp - 5977B SQ: - Source: None EI - Extractor	
July 6, 2022 1:57:10 PM	End	Execution	Log Amp - 5977B SQ: - Source: EI EI - Extractor	Run Count : 1
July 6, 2022 1:57:24 PM	Start	Execution	RFPA - 5977B SQ: - Source: EI - Extractor	None
July 6, 2022 2:09:24 PM	End	Execution	RFPA - 5977B SQ: - Source: EI - Extractor	Run Count : 1
July 6, 2022 2:09:28 PM	Start	Execution	Tune EI - 5977B SQ: - Source: - None EI - Extractor Filament 1 (Qualitative - No setpoints associated)	
July 6, 2022 2:24:46 PM	End	Qualification	Session	OQ
July 6, 2022 2:24:46 PM	Start	Reporting	Session	None
July 6, 2022 2:41:39 PM	End	Reporting	Session	None
July 6, 2022 2:41:39 PM	Start	Configuration	Session	None
July 6, 2022 2:41:40 PM	End	Configuration	Session	None

User Name: eaknarin_puangsoa
 Hostname: ASRYGW7002

System Id: RYG_EN0136
 Print Date: July 7, 2022 11:27:56 AM

ALS_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 6, 2022 2:41:40 PM	Start	Qualification	Session	OQ
July 6, 2022 2:41:40 PM	Start	Execution	Tune EI - 5977B SQ: - Source: - None EI - Extractor Filament 1 (Qualitative - No setpoints associated)	
July 6, 2022 2:41:56 PM	End	Execution	Tune EI - 5977B SQ: - Source: - Run Count : 1 EI - Extractor Filament 1 (Qualitative - No setpoints associated)	
July 6, 2022 2:41:58 PM	Start	Execution	Tune EI - 5977B SQ: - Source: - None EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
July 6, 2022 2:42:48 PM	End	Qualification	Session	OQ
July 6, 2022 2:42:48 PM	Start	Reporting	Session	None
July 6, 2022 2:50:52 PM	End	Reporting	Session	None
July 6, 2022 2:50:52 PM	Start	Qualification	Session	OQ
July 6, 2022 2:50:52 PM	Start	Execution	Tune EI - 5977B SQ: - Source: - None EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
July 6, 2022 2:51:12 PM	End	Qualification	Session	OQ
July 6, 2022 2:51:12 PM	Start	Reporting	Session	None
July 6, 2022 2:55:29 PM	End	Reporting	Session	None
July 6, 2022 2:55:29 PM	Start	Qualification	Session	OQ
July 6, 2022 2:55:29 PM	Start	Execution	Tune EI - 5977B SQ: - Source: - None EI - Extractor Filament 2 (Qualitative - No setpoints associated)	

User Name: eaknarin_puangsoapa
 Hostname: ASRYGW7002

System Id: RYG_EN0136
 Print Date: July 7, 2022 11:27:56 AM

ALS_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 6, 2022 2:55:40 PM	End	Execution	Tune EI - 5977B SQ: - Source: - Run Count : 1 EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
July 6, 2022 2:55:45 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 6, 2022 3:21:52 PM	End	Qualification	Session	OQ
July 6, 2022 3:21:52 PM	Start	Reporting	Session	None
July 6, 2022 3:25:04 PM	End	Reporting	Session	None
July 6, 2022 3:25:04 PM	Start	Qualification	Session	OQ
July 6, 2022 3:25:04 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 6, 2022 4:06:40 PM	Audit	AceClosed	Session	None
July 7, 2022 9:13:47 AM	Audit	AceRestarted	Session	None
July 7, 2022 9:13:49 AM	Audit	SessionReloaded	Session	None
July 7, 2022 9:13:54 AM	Start	Qualification	Session	OQ
July 7, 2022 9:13:54 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 7, 2022 9:58:06 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : D:\OQ2022\OQFN_SN_F01.D

User Name: eaknarin_puangsoa
 Hostname: ASRYGW7002

System Id: RYG_EN0136
 Print Date: July 7, 2022 11:27:56 AM

ALS_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 7, 2022 9:59:53 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 1
July 7, 2022 10:01:46 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Deviation filed for Run Count : 1
July 7, 2022 10:01:46 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 7, 2022 10:02:00 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F01.D
July 7, 2022 10:04:55 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 2
July 7, 2022 10:07:30 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Deviation filed for Run Count : 2
July 7, 2022 10:07:30 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 7, 2022 10:07:44 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F01.D

User Name: eaknarin_puangsoa
 Hostname: ASRYGW7002

System Id: RYG_EN0136
 Print Date: July 7, 2022 11:27:56 AM

ALS_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 7, 2022 10:08:18 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 3
July 7, 2022 10:10:28 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Deviation filed for Run Count : 3
July 7, 2022 10:10:28 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 7, 2022 10:10:55 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F01.D
July 7, 2022 10:14:03 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 4
July 7, 2022 10:14:54 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Deviation filed for Run Count : 4
July 7, 2022 10:14:54 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 7, 2022 10:15:15 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F01.D

User Name: eaknarin_puangsoa
 Hostname: ASRYGW7002

System Id: RYG_EN0136
 Print Date: July 7, 2022 11:27:56 AM

ALS_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 7, 2022 10:15:27 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 5
July 7, 2022 10:16:48 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Deviation filed for Run Count : 5
July 7, 2022 10:16:48 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 7, 2022 10:17:05 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F01.D
July 7, 2022 10:17:14 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 6
July 7, 2022 10:18:40 AM	End	Qualification	Session	OQ
July 7, 2022 10:18:40 AM	Start	Reporting	Session	None
July 7, 2022 10:21:10 AM	End	Reporting	Session	None
July 7, 2022 10:21:10 AM	Start	Qualification	Session	OQ
July 7, 2022 10:21:17 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
July 7, 2022 10:56:49 AM	End	Qualification	Session	OQ
July 7, 2022 10:56:49 AM	Start	Reporting	Session	None
July 7, 2022 10:57:38 AM	End	Reporting	Session	None

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User Name: eaknarin_puangsoa
 Hostname: ASRYGW7002

System id: RYG_EN0136
 Print Date: July 7, 2022 11:27:56 AM

ALS_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 7, 2022 10:57:38 AM	Start	Qualification	Session	OQ
July 7, 2022 10:57:38 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
July 7, 2022 11:06:50 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F021.D
July 7, 2022 11:11:47 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
July 7, 2022 11:13:13 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 1
July 7, 2022 11:14:29 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Deviation filed for Run Count : 1
July 7, 2022 11:14:29 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
July 7, 2022 11:14:47 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F021.D
July 7, 2022 11:16:34 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 2

User Name: eaknarin_puangsoa

System Id: RYG_EN0136

Hostname: ASRYGW7002

Print Date: July 7, 2022 11:27:56 AM

ALS_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 7, 2022 11:19:56 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Deviation filed for Run Count : 2
July 7, 2022 11:19:56 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
July 7, 2022 11:20:13 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F021.D
July 7, 2022 11:21:52 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 3
July 7, 2022 11:22:49 AM	End	Qualification	Session	OQ
July 7, 2022 11:22:49 AM	Start	Reporting	Session	None
July 7, 2022 11:26:46 AM	Audit	Reporting	Session	Report Generated : Certificate



ROTA METER CALIBRATION RESULT JULY 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS0577	03 Jul 23	$Y = 1.2484x - 0.6741$	0.9931
BKK_FS0579	03 Jul 23	$Y = 1.0997x - 0.4918$	1.0000
BKK_FS0583	01 Jul 23	$Y = 1.0068x + 1.6459$	0.9998
BKK_FS0584	01 Jul 23	$Y = 0.9804x + 9.469$	0.9999
BKK_FS0585	07 Jul 23	$Y = 1.0248x + 0.8333$	0.9996
BKK_FS0586	01 Jul 23	$Y = 0.9907x + 11.074$	1.0000
BKK_FS0587	07 Jul 23	$Y = 0.986x + 17.77$	0.9993
BKK_FS0588	01 Jul 23	$Y = 0.9751x + 9.8452$	0.9999
BKK_FS0589	03 Jul 23	$Y = 1.0174x + 0.0381$	1.0000
BKK_FS0590	01 Jul 23	$Y = 1.0127x - 3.4333$	1.0000
BKK_FS0591	03 Jul 23	$Y = 1.0452x - 51.824$	0.9998
BKK_FS0592	07 Jul 23	$Y = 1.0003x + 14.344$	1.0000
BKK_FS0593	01 Jul 23	$Y = 1.0386x - 41.415$	0.9997
BKK_FS0594	07 Jul 23	$Y = 1.0025x + 6.32$	0.9999
BKK_FS0595	01 Jul 23	$Y = 1.0871x - 114.97$	0.9985
BKK_FS0596	03 Jul 23	$Y = 1.038x - 51.974$	0.9993
BKK_FS0597	01 Jul 23	$Y = 1.0059x - 9.9086$	1.0000
BKK_FS1004	01 Jul 23	$Y = 1.0186x + 6.731$	0.9998
BKK_FS1005	01 Jul 23	$Y = 0.9922x + 13.993$	0.9970
BKK_FS1006	01 Jul 23	$Y = 1.1747x - 3.1235$	0.9991
BKK_FS1007	07 Jul 23	$Y = 1.0737x + 0.8677$	0.9997
BKK_FS1008	07 Jul 23	$Y = 1.0446x + 1.2156$	0.9999
BKK_FS1009	01 Jul 23	$Y = 1.1044x - 0.8245$	1.0000
BKK_FS1010	03 Jul 23	$Y = 1.2271x - 2.0139$	1.0000
BKK_FS1011	03 Jul 23	$Y = 1.261x - 1.7003$	1.0000
BKK_FS1012	03 Jul 23	$Y = 0.9978x - 3.7238$	0.9990
BKK_FS1013	03 Jul 23	$Y = 1.0245x - 28.65$	0.9999
BKK_FS1014	01 Jul 23	$Y = 1.3135x - 7.0966$	0.9961
BKK_FS1015	01 Jul 23	$Y = 0.9802x + 3.8214$	0.9999
BKK_FS1016	01 Jul 23	$Y = 1.0726x - 85.581$	0.9995
BKK_FS1020	01 Jul 23	$Y = 1.1161x - 1.1986$	1.0000
BKK_FS1021	01 Jul 23	$Y = 0.9566x + 16.524$	0.9987
BKK_FS1022	01 Jul 23	$Y = 1.0712x - 89.51$	0.9990
BKK_FS1023	01 Jul 23	$Y = 1.3791x - 8.8721$	0.9944
BKK_FS1024	01 Jul 23	$Y = 0.9449x + 11.421$	0.9993
BKK_FS1025	01 Jul 23	$Y = 1.0477x - 41.116$	1.0000
BKK_FS1026	01 Jul 23	$Y = 1.3389x - 4.918$	1.0000
BKK_FS1027	01 Jul 23	$Y = 0.9852x + 1.5238$	1.0000
BKK_FS1028	01 Jul 23	$Y = 1.0281x - 19.897$	0.9996



ROTA METER CALIBRATION RESULT JULY 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS1029	01 Jul 23	$Y = 1.3382x - 8.9776$	0.9941
BKK_FS1030	01 Jul 23	$Y = 0.9818x + 2.3476$	0.9995
BKK_FS1031	01 Jul 23	$Y = 1.0526x - 64.415$	0.9997
BKK_FS1039	01 Jul 23	$Y = 0.998x + 14.823$	0.9997
BKK_FS1040	01 Jul 23	$Y = 1.0041x - 2.7552$	0.9999
BKK_FS1041	01 Jul 23	$Y = 1.116x - 1.0078$	0.9999
BKK_FS1042	01 Jul 23	$Y = 1.0209x + 3.56$	0.9980
BKK_FS1043	01 Jul 23	$Y = 1.0039x - 5.0143$	0.9999
BKK_FS1044	01 Jul 23	$Y = 1.0807x + 0.9837$	0.9998
BKK_FS1164	03 Jul 23	$Y = 1.0589x + 4.6061$	0.9996
BKK_FS1165	03 Jul 23	$Y = 0.9809x + 7.5262$	0.9981
BKK_FS1166	03 Jul 23	$Y = 1.0567x - 50.446$	0.9999
BKK_FS1200	03 Jul 23	$Y = 1.3634x - 1.3816$	0.9991
BKK_FS1201	03 Jul 23	$Y = 1.0388x - 7.0524$	0.9999
BKK_FS1202	03 Jul 23	$Y = 1.0518x - 59.531$	0.9998
RYG_FS0197	01 Jul 23	$Y = 1.0087x - 3.2838$	0.9999
RYG_FS0198	01 Jul 23	$Y = 0.9877x + 36.487$	0.9999
RYG_FS0199	01 Jul 23	$Y = 1.0299x - 0.367$	0.9992
PHK_FS0027	13 Jul 23	$Y = 1.1219x - 2.2432$	0.9984
PHK_FS0028	13 Jul 23	$Y = 1.0341x - 6.7967$	0.9999
PHK_FS0029	13 Jul 23	$Y = 0.9977x + 8.7829$	0.9999
SGK_FS0135	14 Jul 23	$Y = 0.9877x + 11.513$	0.9974
SGK_FS0138	13 Jul 23	$Y = 1.0571x - 1.1565$	0.9991
SGK_FS0139	13 Jul 23	$Y = 0.9801x + 8.6267$	0.9997
SGK_FS0140	13 Jul 23	$Y = 0.9978x + 11.644$	1.0000
SGK_FS0141	13 Jul 23	$Y = 1.1349x - 2.2867$	0.9990
SGK_FS0142	13 Jul 23	$Y = 0.9915x + 11.403$	0.9994
SGK_FS0143	13 Jul 23	$Y = 1.0054x - 4.0648$	1.0000

Review By :

(Mr. Wichan Choonharat)

Enviro Field Services Manager

Approved By :

(Mr. Sarayuth Jittranont)

Assistant General Manager



ROTA METER CALIBRATION RESULT OCTOBER 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS0577	02 Oct 23	$Y = 1.2862x - 1.2952$	0.9963
BKK_FS0579	02 Oct 23	$Y = 1.2546x + 0.0065$	0.9946
BKK_FS0583	03 Oct 23	$Y = 1.0773x - 2.4138$	0.9989
BKK_FS0584	02 Oct 23	$Y = 0.9787x + 12.569$	0.9999
BKK_FS0585	18 Oct 23	$Y = 1.0322x + 3.7767$	0.9998
BKK_FS0586	02 Oct 23	$Y = 0.9777x + 15.405$	0.9997
BKK_FS0587	18 Oct 23	$Y = 1.0175x + 14.717$	0.9997
BKK_FS0589	03 Oct 23	$Y = 1.0148x + 2.4143$	1.0000
BKK_FS0590	03 Oct 23	$Y = 1.0088x + 0.8429$	1.0000
BKK_FS0591	02 Oct 23	$Y = 1.0733x - 88.805$	0.9989
BKK_FS0592	18 Oct 23	$Y = 1.0037x + 10.388$	1.0000
BKK_FS0593	02 Oct 23	$Y = 1.0538x - 60.63$	0.9996
BKK_FS0594	18 Oct 23	$Y = 1.0052x + 5.3238$	0.9999
BKK_FS0596	03 Oct 23	$Y = 1.0449x - 48.241$	0.9996
BKK_FS0597	03 Oct 23	$Y = 1.0697x - 83.62$	0.9994
BKK_FS1004	02 Oct 23	$Y = 0.9855x + 14.75$	0.9992
BKK_FS1005	02 Oct 23	$Y = 1.02x + 1.7167$	0.9996
BKK_FS1006	02 Oct 23	$Y = 1.1762x - 3.5619$	0.9999
BKK_FS1007	18 Oct 23	$Y = 1.1405x + 2.6044$	0.9993
BKK_FS1008	18 Oct 23	$Y = 1.1267x + 4.8333$	0.9991
BKK_FS1010	03 Oct 23	$Y = 1.0027x + 2.5832$	0.9986
BKK_FS1011	02 Oct 23	$Y = 1.3811x - 6.2068$	0.9998
BKK_FS1012	02 Oct 23	$Y = 1.0017x + 0.9$	1.0000
BKK_FS1013	02 Oct 23	$Y = 1.0593x - 46.02$	0.9994
BKK_FS1014	03 Oct 23	$Y = 1.0961x - 1.6895$	0.9983
BKK_FS1015	03 Oct 23	$Y = 0.9979x + 6.2595$	0.9993
BKK_FS1016	03 Oct 23	$Y = 1.0683x - 82.491$	0.9995
BKK_FS1017	06 Oct 23	$Y = 0.9981x - 2.2235$	0.9998
BKK_FS1018	06 Oct 23	$Y = 0.9817x - 20.653$	0.9999
BKK_FS1019	06 Oct 23	$Y = 1.0152x - 64.485$	0.9998
BKK_FS1020	02 Oct 23	$Y = 1.2691x - 2.4721$	0.9983
BKK_FS1021	02 Oct 23	$Y = 1.0036x + 2.3286$	0.9999
BKK_FS1022	02 Oct 23	$Y = 1.0633x - 73.266$	0.9990
BKK_FS1023	03 Oct 23	$Y = 1.0879x - 1.0694$	0.9984
BKK_FS1024	02 Oct 23	$Y = 1.0035x + 1.4857$	1.0000
BKK_FS1025	03 Oct 23	$Y = 1.0556x - 58.597$	0.9999
BKK_FS1026	02 Oct 23	$Y = 1.2894x - 1.497$	0.9970
BKK_FS1027	02 Oct 23	$Y = 1.0032x + 1.5167$	1.0000
BKK_FS1028	02 Oct 23	$Y = 1.0433x - 30.012$	0.9994



ROTA METER CALIBRATION RESULT OCTOBER 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS1029	02 Oct 23	$Y = 1.3494x - 3.5078$	0.9981
BKK_FS1030	02 Oct 23	$Y = 1.0015x + 1.2214$	1.0000
BKK_FS1031	02 Oct 23	$Y = 1.0516x - 56.996$	0.9994
BKK_FS1039	02 Oct 23	$Y = 0.9991x + 14.527$	0.9994
BKK_FS1040	02 Oct 23	$Y = 1.0049x - 2.4324$	1.0000
BKK_FS1041	02 Oct 23	$Y = 1.1682x - 2.1293$	1.0000
BKK_FS1042	02 Oct 23	$Y = 1.0051x + 6.2533$	0.9989
BKK_FS1043	02 Oct 23	$Y = 1.0022x + 3.96$	1.0000
BKK_FS1044	02 Oct 23	$Y = 1.0796x + 2.9806$	0.9993
BKK_FS1164	02 Oct 23	$Y = 1.2714x + 0.234$	0.9945
BKK_FS1165	02 Oct 23	$Y = 1.0029x + 3.3571$	0.9994
BKK_FS1166	02 Oct 23	$Y = 1.061x - 56.83$	1.0000
BKK_FS1200	02 Oct 23	$Y = 1.2803x - 1.4599$	0.9962
BKK_FS1201	02 Oct 23	$Y = 1.0374x - 6.1952$	1.0000
BKK_FS1202	02 Oct 23	$Y = 1.0486x - 44.05$	0.9997
PHK_FS0027	09 Oct 23	$Y = 1.1052x + 1.0293$	1.0000
PHK_FS0028	09 Oct 23	$Y = 1.0377x - 1.9833$	1.0000
PHK_FS0029	09 Oct 23	$Y = 1.0021x + 7.5248$	1.0000
RYG_FS0197	02 Oct 23	$Y = 1.0036x + 9.0133$	1.0000
RYG_FS0198	02 Oct 23	$Y = 0.9991x + 17.568$	1.0000
RYG_FS0199	02 Oct 23	$Y = 1.0814x - 1.2993$	0.9997
RYG_FS0654	02 Oct 23	$Y = 1.1168x - 2.1207$	1.0000
RYG_FS0655	02 Oct 23	$Y = 1.0086x + 6.2733$	0.9991
RYG_FS0656	02 Oct 23	$Y = 1.0009x + 8.48$	1.0000
RYG_FS0657	02 Oct 23	$Y = 1.0435x + 2.6459$	0.9999
RYG_FS0658	02 Oct 23	$Y = 0.9788x + 10.283$	0.9992
RYG_FS0659	02 Oct 23	$Y = 1.0074x - 6.621$	1.0000
SGK_FS0135	18 Oct 23	$Y = 0.9831x + 14.843$	0.9994
SGK_FS0138	06 Oct 23	$Y = 1.0831x - 0.8401$	0.9998
SGK_FS0139	06 Oct 23	$Y = 0.9826x + 8.6567$	1.0000
SGK_FS0140	06 Oct 23	$Y = 1.0011x + 7.8095$	1.0000
SGK_FS0141	06 Oct 23	$Y = 1.125x - 1.2259$	0.9998
SGK_FS0142	06 Oct 23	$Y = 0.9956x + 10.257$	0.9997
SGK_FS0143	06 Oct 23	$Y = 1.004x + 3.3105$	1.0000

Review By :

(Mr. Wichan Choonharat)

Enviro Field Services Manager

Approved By :

(Mr. Sarayuth Jittrantont)

Assistant General Manager

Certificate of System Qualification

GC-OQ

REVIEW BY	<i>Jinda K.</i>
APPROVED BY	<i>Tanyatorn M.</i>
NEXT CAL. DATE	<i>21 Oct 24</i>

System ID: CN11461066
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Soi 40 Phatthanakan Rd, Khwang Suan Luang, Khet Suan Luang, Bangkok 10250

Date: April 21, 2023 3:26:38 PM
EQP Name: AgilentRecommended
EQP Revision: GC.02.52
Overall Qualification Status: Pass

CDS Logon Verification - GC

Logon: Saenguthai Tarak

Overall CDS Logon Verification - GC Test 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

Date: April 21, 2023 3:26:38 PM
System ID: CN11461066

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name:

7890

Front

SSL

Setpoint Status:

Pass

Setpoint

Actual

Inlet Pressure:

25.0

psi

25.2

psi

Accuracy:

0.2

psi

Agilent Recommended:

<=

1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Inlet Pressure Decay

Name:

7890

Back

SSL

Setpoint Status:

Pass

Pressure:

25.0

psi

Pressure Change:

0.0

psi

/5 minutes

Agilent Recommended:

>=

-2.0

and

<=

0.5

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name:

7890

Back

SSL

Date:

April 21, 2023 3:26:38 PM

System ID:

CN11461066

Setpoint Status:

Pass

	Setpoint	Actual
Inlet Pressure:	25.0 psi	24.8 psi
Accuracy:		0.2 psi
Agilent Recommended:	<=	1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Name:

7890

Front

FID

Setpoint Status:

Pass

Flow Type:

Fuel

Setpoint:

30.0 mL/min

Measured Flow:

28.9 mL/min

Accuracy:

1.1 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:

400 mL/min

Accuracy:

0.0 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:

24.9 mL/min

Accuracy:

0.1 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

Detector Flow Accuracy

Name: 7890

Back FID

Setpoint Status: Pass

Flow Type: Fuel

Setpoint: 30.0 mL/min

Measured Flow: 30.7 mL/min

Accuracy: 0.7 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: 399 mL/min

Accuracy: 1.0 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: 24.6 mL/min

Accuracy: 0.4 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: 7890

Date: April 21, 2023 3:26:38 PM

System ID: CN11461066

Setpoint Status:	Pass			
Zone:	Oven			
	Setpoint/Actual			
Temperature:	230.0	230.6	°C	
Accuracy:		0.6	°C	
Agilent Recommended:	>=	-1.0	% setpoint in K	(-5.0 °C)
	<=	1.0	% setpoint in K	(5.0 °C)

Setpoint Status:	Pass			
Zone:	Oven			
	Setpoint/Actual			
Temperature:	100.0	100.9	°C	
Accuracy:		0.9	°C	
Agilent Recommended:	>=	-1.0	% setpoint in K	(-3.7 °C)
	<=	1.0	% setpoint in K	(3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name:	7890			
Setpoint Status:	Pass			
	Setpoint/Average			
Temperature:	100.0	100.8833	°C	
Stability:		0.1	°C	
Agilent Recommended:	<=	0.5		

Overall GC Oven Temperature Stability Test Status

Pass

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:

22.7 pA

ASTM Noise

pA

0.06

<=

0.10

Drift

pA/Hr

0.05

<=

2.50

Agilent Recommended:

Status:

Pass

Pass

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination1

Front

SSL

/ Front

FID

Name:

7693A

Setpoint Status:

Pass

Injection Volume on Column:

1.0 uL

Area RSD:

0.32 %

Retention Time RSD:

0.67 %

Agilent Recommended:

<=

3.00

<=

1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Date:

April 21, 2023 3:26:38 PM

System ID:

CN11461066

Tested Combination1 Front SSL / Front FID

Injection Tower

Name: 7890

Setpoint Status: Pass

Signal to Noise: 721755

Agilent Recommended: \geq 300000

Overall Signal to Noise Test Status

Pass

Scouting Run

Tested Combination2 Back SSL / Back FID

Injection Tower

Name: 7693A

Setpoint Status: Completed

Injection Volume on Column: 1.0 μ L

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination2 Back SSL / Back FID

Name: 7890

Setpoint Status: Pass

Base Signal: 22.6 pA

ASTM Noise

pA

0.07

Agilent Recommended:

 \leq 0.10

Status: Pass

Drift

pA/Hr

0.09

 \leq 2.50

Pass

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination2

Back

SSL

/ Back

FID

Name:

7693A

Setpoint Status:

Pass

Injection Volume on Column:

1.0

uL

Area RSD:

1.28

%

Retention Time RSD:

0.83

%

Agilent Recommended:

<=

3.00

<=

1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination2

Back

SSL

/ Back

FID

Injection Tower

Name:

7890

Setpoint Status:

Pass

Signal to Noise:

2404398

Agilent Recommended:

>=

300000

Overall Signal to Noise Test Status

Pass

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	CN11461066
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
Sampler Identifier	Sampler 2
Inlet	Front
Detector	Front
LTM Included?	No

Tested Combination2

Injection Technique	Injection Tower
Sampler Identifier	Sampler 3
Inlet	Back
Detector	Back
LTM Included?	No



Sampler 1

Manufacturer	Agilent Technologies
Type	Tray
Name	7693A
Model Number	G4514A
Serial Number	CN15380030
Firmware Revision	A.11.01
Vial Heater	Not installed

Sampler 2

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN16280128
Firmware Revision	A.10.09
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10

Sampler 3

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN10340103
Firmware Revision	A.10.09
Usage	Sample Injection
Location	Back
Syringe Volume (µL)	10

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN11461066
Firmware Revision	Version 4.27
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

Inlet 2

Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Back
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

Detector 2

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

Electronic Signature

Purpose

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Details

Full Name of Signer:	Saenguthai Tarak
Logged On User Name:	saenguthai.tarak@non.agilent.com
Signature Creation Date:	April 21, 2023
Reason for Signature:	Executed protocol and published this original version of document

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GC-6_BKK_EN0127_ALS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:21:36 AM	Audit	SessionCreated	Session	None
April 21, 2023 11:21:36 AM	Start	Configuration	Session	None
April 21, 2023 11:21:36 AM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
April 21, 2023 11:22:04 AM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.52/Gc.02.52.eqp], EQP File Name: [Gc.02.52.eqp], EQP Name: [AgilentRecommended], Protocol Revision :[Gc.02.52]
April 21, 2023 11:22:06 AM	End	Configuration	Session	None
April 21, 2023 11:22:14 AM	Start	Qualification	Session	OQ
April 21, 2023 11:22:14 AM	Start	Execution	CDS Logon Verification - GC : - Qualitative test	None
April 21, 2023 11:23:14 AM	End	Execution	CDS Logon Verification - GC : - Qualitative test	Run Count : 1
April 21, 2023 11:23:16 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
April 21, 2023 11:23:35 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1
April 21, 2023 11:23:37 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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GC-6_BKK_EN0127_ALS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:24:01 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
April 21, 2023 11:24:04 AM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: ≤ 1.2 psi	None
April 21, 2023 11:24:09 AM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: ≤ 1.2 psi	Run Count : 1
April 21, 2023 11:24:11 AM	Start	Execution	Inlet Pressure Decay - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and ≤ 0.5 psi	None
April 21, 2023 11:24:43 AM	End	Execution	Inlet Pressure Decay - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and ≤ 0.5 psi	Run Count : 1
April 21, 2023 11:24:45 AM	Start	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: ≤ 1.2 psi	None
April 21, 2023 11:24:51 AM	End	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: ≤ 1.2 psi	Run Count : 1
April 21, 2023 11:24:53 AM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: ≤ 10.0% setpoint	None
April 21, 2023 11:25:20 AM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: ≤ 10.0% setpoint	Manual Data Entry
April 21, 2023 11:25:25 AM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: ≤ 10.0% setpoint	Run Count : 1

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System Id: CN11461066
 Print Date: April 21, 2023 3:26:40 PM

GC-6_BKK_EN0127_ALS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:25:26 AM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
April 21, 2023 11:25:40 AM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
April 21, 2023 11:25:42 AM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
April 21, 2023 11:25:44 AM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
April 21, 2023 11:26:01 AM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
April 21, 2023 11:26:04 AM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
April 21, 2023 11:26:05 AM	Start	Execution	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None
April 21, 2023 11:26:19 AM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
April 21, 2023 11:26:22 AM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
April 21, 2023 11:26:24 AM	Start	Execution	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
April 21, 2023 11:26:38 AM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry

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Date: April 21, 2023 3:26:38 PM
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 Print Date: April 21, 2023 3:26:40 PM

GC-6_BKK_EN0127_ALS Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:26:43 AM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
April 21, 2023 11:26:45 AM	Start	Execution	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
April 21, 2023 11:27:01 AM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
April 21, 2023 11:27:05 AM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
April 21, 2023 11:27:07 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
April 21, 2023 11:27:33 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
April 21, 2023 11:27:35 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
April 21, 2023 11:27:37 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
April 21, 2023 11:27:54 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

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GC-6_BKK_EN0127_ALS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:27:57 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
April 21, 2023 11:27:59 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
April 21, 2023 11:29:07 AM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
April 21, 2023 11:29:10 AM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
April 21, 2023 11:29:12 AM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	None
April 21, 2023 11:30:27 AM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023 2023-04-20 14-36-08\F_SC01.D\FID1A.c h
April 21, 2023 11:31:04 AM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated	Run Count : 1
April 21, 2023 11:31:07 AM	Start	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None

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GC-6_BKK_EN0127_ALS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:31:43 AM	Audit	Data	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023 2023-04-20 14-36-08\ND-01-005F.D\FID 1A.ch
April 21, 2023 11:32:00 AM	End	Execution	Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1
April 21, 2023 11:32:03 AM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
April 21, 2023 11:32:23 AM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
April 21, 2023 11:33:55 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023 2023-04-20 14-36-08\Pre01-013F.D\FID 1A.ch
April 21, 2023 11:33:55 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023 2023-04-20 14-36-08\Pre01-014F.D\FID 1A.ch

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GC-6_BKK_EN0127_ALS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:33:55 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023 2023-04-20 14-36-08\Pre01--015F.D\FID 1A.ch
April 21, 2023 11:33:55 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023 2023-04-20 14-36-08\Pre01--016F.D\FID 1A.ch
April 21, 2023 11:33:59 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023 2023-04-20 14-36-08\Pre01--017F.D\FID 1A.ch
April 21, 2023 11:33:59 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023 2023-04-20 14-36-08\Pre01--018F.D\FID 1A.ch
April 21, 2023 11:35:00 AM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1
April 21, 2023 11:35:04 AM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	None

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 Print Date: April 21, 2023 3:26:40 PM

GC-6_BKK_EN0127_ALS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:35:28 AM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023 2023-04-20 14-36-08\SN_Front.D\FID1A. ch
April 21, 2023 11:36:00 AM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000	Run Count : 1
April 21, 2023 11:36:03 AM	Start	Execution	GC Scouting Run - Injection Tower, Back SSL, Back FID: - Part of System Preparation - No limits associated	None
April 21, 2023 11:36:36 AM	Audit	Data	GC Scouting Run - Injection Tower, Back SSL, Back FID: - Part of System Preparation - No limits associated	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023 2023-04-20 14-36-08\B_SC01.D\FID2B.c h
April 21, 2023 11:37:30 AM	End	Execution	GC Scouting Run - Injection Tower, Back SSL, Back FID: - Part of System Preparation - No limits associated	Run Count : 1
April 21, 2023 11:37:32 AM	Start	Execution	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None

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 Print Date: April 21, 2023 3:26:40 PM

GC-6_BKK_EN0127_ALS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:38:06 AM	Audit	Data	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023 2023-04-20 14-36-08\ND-01-005B.D\FID 2B.ch
April 21, 2023 11:38:23 AM	End	Execution	Noise and Drift - Back FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count : 1
April 21, 2023 11:38:32 AM	Start	Execution	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
April 21, 2023 11:38:51 AM	Start	Execution	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
April 21, 2023 11:40:17 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023_Pre 2023-04-21 10-37-32\Pre11-004B.D\FID 2B.ch
April 21, 2023 11:40:17 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023_Pre 2023-04-21 10-37-32\Pre11-005B.D\FID 2B.ch

User Name: saenguthai.tarak
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System Id: CN11461066
 Print Date: April 21, 2023 3:26:40 PM

GC-6_BKK_EN0127_ALS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:40:17 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023_Pre 2023-04-21 10-37-32\Pre11-006B.D\FID 2B.ch
April 21, 2023 11:40:17 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023_Pre 2023-04-21 10-37-32\Pre11-007B.D\FID 2B.ch
April 21, 2023 11:40:21 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023_Pre 2023-04-21 10-37-32\Pre11-008B.D\FID 2B.ch
April 21, 2023 11:40:21 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023_Pre 2023-04-21 10-37-32\Pre11-009B.D\FID 2B.ch
April 21, 2023 11:41:29 AM	End	Execution	Injection Precision - Injection Tower, Back SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1
April 21, 2023 11:41:33 AM	Start	Execution	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 300000	None

User Name: saenguthai.tarak
 Hostname: LAPTOP-CQ3SKOMV

System Id: CN11461066
 Print Date: April 21, 2023 3:26:40 PM

GC-6_BKK_EN0127_ALS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:42:22 AM	Audit	Data	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 300000	Data files Path : C:\Users\Public\Documents\C hemStation\3\Data\OQ_GC-6 _ALS_2023-04-20\OQ_GC-6 _2023 2023-04-20 14-36-08\SN_Back.D\FID2B. ch
April 21, 2023 11:42:50 AM	End	Execution	Signal to Noise - Injection Tower, Back SSL, Back FID: - Detector FID - L: >= 300000	Run Count : 1
April 21, 2023 11:42:53 AM	End	Qualification	Session	OQ
April 21, 2023 11:42:53 AM	Start	Reporting	Session	None
April 21, 2023 12:01:47 PM	Audit	AceClosed	Session	None
April 21, 2023 3:16:07 PM	Audit	AceRestarted	Session	None
April 21, 2023 3:16:10 PM	Audit	SessionReloaded	Session	None
April 21, 2023 3:16:31 PM	Start	Qualification	Session	OQ
April 21, 2023 3:20:59 PM	Audit	AceRestarted	Session	None
April 21, 2023 3:21:00 PM	Audit	SessionReloaded	Session	None
April 21, 2023 3:21:07 PM	Start	Qualification	Session	OQ
April 21, 2023 3:25:45 PM	Audit	Reporting	Session	Report Generated : Certificate



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CALIBRATION 0367

Air speed measurement laboratory
Calibration services department.

REVIEW BY

Warakorn P.

APPROVED BY

19/4/24

NEXT CAL DATE

19/4/24

Certificate Number

CL-010-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM : Wind Direction Sensor
MANUFACTURER : Novalynx
MODEL/TYPE : Sensor: WS-02F
Data logger: 200-WS-25DL
SERIAL NUMBER : Sensor: -
Data logger: A4986
ID NUMBER : RYG_FS0087
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE : 16 Jan 2023
MEASUREMENT DATE : 19 Jan 2023
ISSUE DATE : 20 Jan 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH
Atmospheric Pressure : 1010 ± 10 hPa

PLACE OF CALIBRATION : Eiffel-type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITION : Wind tunnel cross-section area¹ 900 cm²
Win direction frontal area² 129 cm²
Diameter of mounting pipe³ - mm
Blockage ratio of test object⁴ 0.143 [-]

Preconditioning : 24 hours at ambient conditions.
Measurement Condition : The average values during measurement are (23.5)°C, (47.4) %RH and (1015.6) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

- ☒ Mr. Sorawit Thachalad
☐ Miss Jittraporn Lertsomphol



Approved signatory:

25/Jan

Mr. Parinya Booncharoen
Calibration Department Manager

Remark:

- ¹ Nozzle cross-section area of the wind tunnel
² Projected cross-section area of the tested object include mounting pipe
³ Diameter of mounting pipe
⁴ Ratio ² to ¹

MEASUREMENT RESULTS⁵

The wind direction sensor was calibrated against standard rotary encoder by comparison method. During calibration, the measurement was carried out at 45° intervals in clockwise and counterclockwise directions after offset adjustment has been made. The flow speed of wind tunnel (usually 5 m/s) is kept constant while the sensor is rotated around its vertical axis. The results of calibration and associated measurement uncertainties are reported in the table below.

Air speed m/s	D°_{std} Degree (°)	D°_{uuc} Degree (°)	Error Degree (°)	$U (k=2)$ Degree (°)
5.02	0.000	0	0	0.58
	45.000	43	-2	0.74
	90.000	88	-2	0.74
	135.000	133	-2	0.74
	180.000	179	-1	0.74
	225.000	225	0	0.68
	270.000	273	3	0.58
	315.000	319	4	0.74

Remark:

⁵ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place

⁶ Direction of standard

⁷ Direction of Unit Under Calibration

End of Certificate of Calibration





JIRANATEE ASSOCIATES CO.,LTD.

Jiranatee Associates Co.,Ltd.
63/14-15, 67/35-36
Petchkasem 7,7/1, Rd. Watthapra, Bangkokyai,
Bangkok 10600 (Thailand)
Tel: +6608680812
Mobile: +66863999453
E-mail: jnac-calibration@jiranatee.com
Web site: www.jiranatee.com

Accredited calibration laboratory
ISO/IEC 17025:2017
NSC-TISI-TIS 17025
CALIBRATION 0367

Air speed measurement laboratory
Calibration services department.

Certificate Number

CL-010-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM : Cup anemometer
MANUFACTURER : Novalynx
MODEL/TYPE : Sensor: WS-02F
Data logger: 200-WS-25DL
SERIAL NUMBER : Sensor: -
Data logger: A4986
ID NUMBER : RYG_FS0087
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (Thailand) co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE : 16 Jan 2023
MEASUREMENT DATE : 18 Jan 2023
ISSUE DATE : 20 Jan 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature	: 23.0 ± 3.0	°C
Relative Humidity	: 55.0 ± 15.0	%RH
Atmospheric Pressure	: 1010 ± 10	hPa

PLACE OF CALIBRATION : Eiffel-type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITIONS	: Wind tunnel cross-section area ¹	900	cm ²
	Win direction frontal area ²	100	cm ²
	Diameter of mounting pipe ³	-	mm
	Blockage ratio of test object ⁴	0.111	[-]

Preconditioning : 24 hours at ambient conditions.
Measurement Condition : The average values during measurement are (23.6) °C, (55.3) %RH and (1013.5) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

- ☒ Mr. Sorawit Thachalad
☐ Miss Jitraporn Lertsomphol



Approved signatory:

26/AmB

Mr. Parinya Booncharoen
Calibration Department Manager

Remark:

- ¹ Nozzle cross-section area of the wind tunnel
² Projected cross-section area of the tested object include mounting pipe
³ Diameter of mounting pipe
⁴ Ratio ² to ¹

MEASUREMENT RESULTS ⁵

The cup anemometer, Unit Under Calibration (UUC) was exercised at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer and above 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 40 mm and 300 mm respectively away from wind tunnel nozzle, UUC was installed at center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

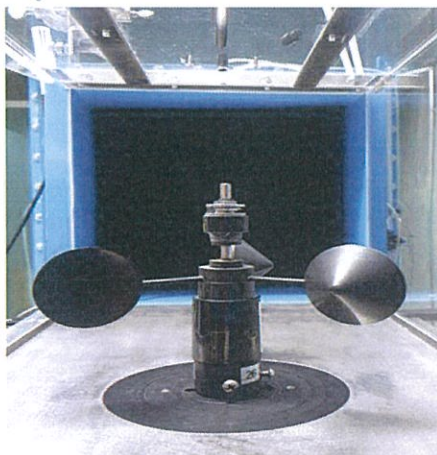
v_{std}^6 (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	v_{uuc}^7 (m/s)	Error (m/s)	$U (k=2)$ (m/s)
0.985	23.68	23.60	0.8	-0.2	0.15
2.033	23.54	23.60	1.8	-0.2	0.16
3.046	23.68	23.60	2.9	-0.1	0.19
4.136	23.66	23.60	3.9	-0.2	0.20
5.03	23.50	23.60	4.9	-0.1	0.20
5.98	23.50	23.60	5.9	-0.1	0.18
7.05	23.36	23.60	7.0	-0.1	0.18
8.18	23.54	23.60	8.0	-0.2	0.20
9.10	23.30	23.60	8.9	-0.2	0.20
10.10	23.50	23.60	10.0	-0.1	0.19
11.14	23.28	23.60	11.1	-0.1	0.22
12.12	23.40	23.60	11.9	-0.2	0.21
13.19	23.10	23.60	13.0	-0.2	0.26
14.25	23.46	23.60	14.0	-0.2	0.32
15.26	23.10	23.60	15.0	-0.2	0.23
16.31	23.26	23.60	16.2	-0.1	0.29

Remark:

⁵ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place

⁶ Velocity of standard

⁷ Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP

Calibration set-up of the cup anemometer calibration in the wind tunnel of Jiranatee Associates Co., Ltd. The cup anemometer shown may differ from the calibrated one. Remark: The proportion of the set-up is not true to scale due to imaging geometry.

End of Certificate of Calibration



Pitot Tube Calibration Data

Pitot Tube Identification Number : RYG_FS0320 Calibration Date : 13 Jul 23
 Lab test duct Number : 258-1-13-01 Standard Pitot ID : BKK_FS0441
 Calibration Sheet No. : C-130723-RYG_FS0320 Cp Standard : 0.99

Type S Pitot Tube Coefficient Data					
	Type s pitot tube Leg A,B	Standard pitot tube (ΔP , mm.H ₂ O)	Type s pitot tube (ΔP , mm.H ₂ O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 2	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 3	A	12.00	16.80	0.845	-
	B	12.00	16.80	-	0.845
				\bar{C}_p	0.842
				0.842	0.842

$$Cp(S) = Cp_{(std)} \sqrt{\frac{\Delta P(std)}{\Delta P(s)}}$$

$$\left[\bar{C}_{p(A)} - \bar{C}_{p(B)} \right] \text{ must BE } \leq 0.01$$

$$\text{Average deviation(A or B)} = \frac{\sum_i [Cp(s) - Cp(A \text{ or } B)]}{3} \text{ must BE } \leq 0.01$$

Calibrated by :

Saksit Phaisanphisut

(Mr. Saksit Phaisanphisut)

Field Scientist (4)

Approved by :

Natthapol Jiengwareewong

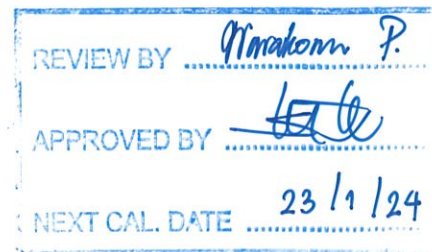
(Mr.Natthapol Jiengwareewong)

Specialist (1)

Certificate No: G 660042

Date of issue : 24-Jan-23

Instrument description : Flue gas Analyzer
Instrument model : Testo 350 New
Instrument serial no. : 62087344
ID no. or control no. : RYG_FS0464
Manufacturer : Testo SE & Co. KGaA
Probe description : -
Probe model : -
Probe serial : -
Customer name : ALS LABORATORY GROUP (THAILAND) CO.,LTD.
Customer address : 104 Phatthanakan 40, Phatthanakan Road, Khwaeng Phatthanakan,
Khet Suan Luang, Bangkok, 10250 Thailand
Total pages of certificate : 3 Pages
Receiving no. : L-230167
Receiving date. : 20-Jan-23
Parameter of calibration : Gas Calibration(Oxygen 2.498,10.04,21.02 %vol, Carbon Monoxide 80.14,309.9,1003 ppm,
Nitrogen Dioxide 30.34,80.96,202.2 ppm, Nitric Oxide 30.08,150.9,320.6 ppm,
Sulphur Dioxide 50.04,100.8,601.1 ppm)
Condition of UUC. : Used
Ambient condition : All of the Measurment were caried out the stabilized labotary
Temperature : 23 ±5 °C
Humidity : 55 ± 15 %RH
Calibration place : 17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210
Calibration procedure no. : WI-CL-28-C



*The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurent
Multiplied by coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.*

This certificate is applied only to item under test Environmental condition.

*This Calibration Certificate may not be reporduced other than in full except with the permission of the issuing laboratory.
Calibration certificates without signature and seal not valid.*

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

Date of calibration : 23-Jan-23



Mr. Sedtawut Nueathong

Calibration Technician



Mrs. Nongluck Wongsettee

Technical Manager

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O ₂) 2.498 % Vol	4219/21	Linde	30-Sep-25
Oxygen (O ₂) 10.04 % Vol	CG-0153-21	Nimt	18-Nov-26
Oxygen (O ₂) 21.02 % Vol	CG-0041-22	Nimt	10-Feb-27
Carbon monoxide (CO) 80.14 ppm	CG-0040-22	Nimt	14-Feb-27
Carbon monoxide (CO) 309.9 ppm	2803/21	Linde	22-Jun-23
Carbon monoxide (CO) 1003 ppm	2583/22	Linde	09-Aug-24
Nitrogen Dioxide (NO ₂) 30.34 ppm	2703/22	Linde	22-Aug-24
Nitrogen Dioxide (NO ₂) 80.96 ppm	2041/22	Linde	26-Jun-24
Nitrogen Dioxide (NO ₂) 202.2 ppm	3239/21	Linde	20-Jul-23
Nitric Oxide (NO) 30.08 ppm	CG-0089-22	Nimt	13-Jun-24
Nitric Oxide (NO) 150.9 ppm	2857/21	Linde	27-Jun-23
Nitric Oxide (NO) 320.6 ppm	2944/21	Linde	02-Jul-23
Sulphur Dioxide (SO ₂) 50.04 ppm	3205/21	Linde	25-Jul-23
Sulphur Dioxide (SO ₂) 100.8 ppm	3507/22	Linde	09-Nov-24
Sulphur Dioxide (SO ₂) 601.1 ppm	3204/21	Linde	20-Jul-23

Measured room conditions

Temperature : 22.2 °C Humidity : 58.9 %RH Pressure : 1014.9 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 1,200 ml/min Gas pressure : 1021.4 mbar

Calibration Results Before Adjustment (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.498	2.47	-0.028	0.20
O ₂ (%Vol)	10.04	9.95	-0.09	0.40
O ₂ (%Vol)	21.02	21.08	0.06	0.80
CO (ppm)	80.14	80	-0.14	3.0
CO (ppm)	309.9	306	-3.9	6.0
CO (ppm)	1003	995	-8	12
NO ₂ (ppm)	30.34	27.9	-2.44	8.0
NO ₂ (ppm)	80.96	74.4	-6.56	8.0
NO ₂ (ppm)	202.2	195.1	-7.1	12
NO (ppm)	30.08	32	1.92	8.0
NO (ppm)	150.9	153	2.1	8.0
NO (ppm)	320.6	315	-5.6	12
SO ₂ (ppm)	50.04	49	-1.04	6.0
SO ₂ (ppm)	100.8	101	0.2	6.0
SO ₂ (ppm)	601.1	603	1.9	13

Calibration Results After Adjustment (Table 3)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O2 (%Vol)	2.498	2.47	-0.028	0.20
O2 (%Vol)	10.04	9.95	-0.09	0.40
O2 (%Vol)	21.02	21.08	0.06	0.80
CO (ppm)	80.14	80	-0.14	3.0
CO (ppm)	309.9	306	-3.9	6.0
CO (ppm)	1003	995	-8	12
NO2 (ppm)	30.34	29.2	-1.14	8.0
NO2 (ppm)	80.96	81.3	0.34	8.0
NO2 (ppm)	202.2	204.4	2.2	12
NO (ppm)	30.08	32	1.92	8.0
NO (ppm)	150.9	153	2.1	8.0
NO (ppm)	320.6	315	-5.6	12
SO2 (ppm)	50.04	49	-1.04	6.0
SO2 (ppm)	100.8	101	0.2	6.0
SO2 (ppm)	601.1	603	1.9	13

Remark : 1 cmol/mol = 1 %vol. , 1 µmol/mol = 1 ppm.

End of Report

SITHIPHORN ASSOCIATES CO.,LTD.

CALIBRATION LABORATORY



451-451/1 Sirinthorn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel.0-2435-8800 Fax.0-2433-1679 e-mail:cal-center@sithiphorn.com http://www.sithiphorn.com

NSC-TISI-TIS 17025
CALIBRATION 0394

Cert. No. : ACC23009

Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-74
Serial No.: 34178121
ID No.: RYG_FS0213

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location : -
Ambient Temperature : (23.0 \pm 3) °C
Pressure : (101.3 \pm 3) kPa
Relative Humidity : (50.0 \pm 20) %

Received Date : 24 JANUARY 2023
Calibration Date : 26 JANUARY 2023
Date of Issue : 27 JANUARY 2023

REVIEW BY	<i>Nathakorn P.</i>
APPROVED BY	<i>[Signature]</i>
NEXT CAL. DATE	26/1/24

Calibrated by : Nathakorn Pisutpaisan

Approved by :

[Signature]
(Thanakul Petchurai)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Continuation of Calibration Certificate

Cert. No. : ACC23009

Job No. : VC66AC0031

Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

This equipment was calibrated by based on IEC-60942-2003 Standard.

The sound pressure level, frequency and total distortion of the sound calibrator was measured using the reference microphone.

Condition of this result of calibration :

1. Reference Standard Instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	33461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23
Audio Analyzer	AVR-3360A	V744B6069	EF-0010-22	07-Feb-23

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

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

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACC23009
Job No. : VC66AC0031
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit (dB)
94	94.16	0.16	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Tolerance limit (%)
1000	1003.2	0.3	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Tolerance limit (%)
1.97	0.10	3.0

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

————— **End of Calibration Certificate** —————

SITHIPHORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY



451-451/1 Sirinthorn Rd., Bangbumru, Bangplud Bangkok 10700 THAILAND.
Tel.0-2435-8800 Fax.0-2433-1679 e-mail:cal-center@sithiphorn.com http://www.sithiphorn.com

NSC-TISI-TIS 17025
CALIBRATION 0394

Cert. No. : ACL23045

Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00900074 / 188467 / 01736
ID No.: RYG_FS0495

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location : -

Ambient Temperature : (23.0 \pm 3) °C
Pressure : (101.3 \pm 3) kPa
Relative Humidity : (50.0 \pm 20) %

Received Date : 06 JANUARY 2023
Calibration Date : 13-18 JANUARY 2023
Date of Issue : 19 JANUARY 2023

REVIEW BY	<i>Nathakorn P.</i>
APPROVED BY	<i>[Signature]</i>
NEXT CAL. DATE	13/1/24

Calibrated by :

Nathakorn Pisutpaisan

Approved by :

[Signature]
(Thanakul Petchurai)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Continuation of Calibration Certificate

Cert. No. : ACL23045

Job No. : VC66AC0024

Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).

The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23

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

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

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACL23045
Job No. : VC66AC0024
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

Continuation of Calibration Certificate

Cert. No. : ACL23045

Job No. : VC66AC0024

Pages : 4 of 8

Result of calibration :**1. Absolute sensitivity**

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.8

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	9.9
C - weight	16.8
Flat	22.8

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			Acceptance Limits
	Flat	C-weight	A-weight	
125	0.4	0.4	0.4	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	-2.0	-1.9	-1.9	±5.0

Continuation of Calibration Certificate

Cert. No. : ACL23045

Job No. : VC66AC0024

Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	-0.1	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	-0.1	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.0	0.0	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

Continuation of Calibration Certificate

Cert. No. : ACL23045

Job No. : VC66AC0024

Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.1	0.1	± 1.1
136.0	136.1	0.1	± 1.1
135.0	135.1	0.1	± 1.1
134.0	134.1	0.1	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.1	0.1	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.1	0.1	± 1.1
114.0	114.1	0.1	± 1.1
109.0	109.1	0.1	± 1.1
104.0	104.1	0.1	± 1.1
99.0	99.1	0.1	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.8	-0.2	± 1.1

Continuation of Calibration Certificate

Cert. No. : ACL23045
Job No. : VC66AC0024
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.4	0.0	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

Continuation of Calibration Certificate

Cert. No. : ACL23045

Job No. : VC66AC0024

Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.5	-0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

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

————— **End of Calibration Certificate** —————

SITHIPHORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

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Cert. No. : ACL23249

Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00734218 / 146937 / 34368
ID No.: RYG_FS0031

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location : -
Ambient Temperature : (23.0 \pm 3) °C
Pressure : (101.3 \pm 3) kPa
Relative Humidity : (50.0 \pm 20) %

Received Date : 13 JULY 2023
Calibration Date : 10 AUGUST 2023
Date of Issue : 11 AUGUST 2023

REVIEW BY	<i>Nathakorn P</i>
APPROVED BY	<i>Thanakul Petchurai</i>
NEXT CAL. DATE	10/8/24

Calibrated by : Nathakorn Pisutpaisan

Approved by :

Thanakul Petchurai
(Thanakul Petchurai)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Continuation of Calibration Certificate

Cert. No. : ACL23249

Job No. : VC66AC0085

Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).

The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
Waveform Generator	33210A	MY48017076	EF-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL.BP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL.BP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EEL.BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAI	34560495	AA-3002-23	14-FEB-24

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

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

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACL23249

Job No. : VC66AC0085

Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

Note : Pass/Fail evaluation for each parameter,
will be considered together from the acceptance limit and the Maximum-permitted uncertainty of measurement.

Continuation of Calibration Certificate

Cert. No. : ACL23249

Job No. : VC66AC0085

Pages : 4 of 8

Result of calibration :**1. Absolute sensitivity**

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
23.3

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	14.8
C - weight	19.7
Flat	25.7

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			Acceptance Limits
	Flat	C-weight	A-weight	
125	0.7	0.8	0.8	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	0.2	0.3	0.3	±5.0

Continuation of Calibration Certificate

Cert. No. : ACL23249

Job No. : VC66AC0085

Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	-0.1	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

Continuation of Calibration Certificate

Cert. No. : ACL23249

Job No. : VC66AC0085

Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	53.9	-0.1	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	38.9	-0.1	± 1.1
34.0	34.0	0.0	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.0	0.0	± 1.1
27.0	27.0	0.0	± 1.1
26.0	26.0	0.0	± 1.1
25.0	25.0	0.0	± 1.1

Continuation of Calibration Certificate

Cert. No. : ACL23249
Job No. : VC66AC0085
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	135.3	-1.1	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

Continuation of Calibration Certificate

Cert. No. : ACL23249

Job No. : VC66AC0085

Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.5	-0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

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

End of Calibration Certificate

SITHIPHORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY



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NSC-TISI-TIS 17025
CALIBRATION 0394

Cert. No. : ACL23247

Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00472127 / 169440 / 72461
ID No.: RYG_FS0302

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location : -
Ambient Temperature : (23.0 \pm 3) °C
Pressure : (101.3 \pm 3) kPa
Relative Humidity : (50.0 \pm 20) %

Received Date : 13 JULY 2023
Calibration Date : 10 AUGUST 2023
Date of Issue : 11 AUGUST 2023

REVIEW BY	<i>Natthakorn P.</i>
APPROVED BY	<i>[Signature]</i>
NEXT CAL. DATE	10/8/24

Calibrated by : Nathakorn Pisutpaisan

Approved by :

[Signature]
(Thanakul Petchurai)

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Continuation of Calibration Certificate

Cert. No. : ACL23247

Job No. : VC66AC0085

Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).

The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
Waveform Generator	33210A	MY48017076	EF-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL.BP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL.BP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EEL.BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAI	34560495	AA-3002-23	14-FEB-24

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

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

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACL23247
Job No. : VC66AC0085
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

Note : Pass/Fail evaluation for each parameter,
will be considered together from the acceptance limit and the Maximum-permitted uncertainty of measurement.

Continuation of Calibration Certificate

Cert. No. : ACL23247

Job No. : VC66AC0085

Pages : 4 of 8

Result of calibration :**1. Absolute sensitivity**

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
18.0

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	13.8
C - weight	20.3
Flat	25.9

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			Acceptance Limits
	Flat	C-weight	A-weight	
125	0.1	0.1	0.1	± 1.5
1000	-0.1	-0.1	0.0	± 1.0
8000	-0.4	-0.3	-0.3	±5.0

Continuation of Calibration Certificate

Cert. No. : ACL23247

Job No. : VC66AC0085

Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	-0.1	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

Continuation of Calibration Certificate

Cert. No. : ACL23247

Job No. : VC66AC0085

Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.1	0.1	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.1	0.1	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.1	0.1	± 1.1
27.0	27.1	0.1	± 1.1
26.0	26.2	0.2	± 1.1
25.0	25.1	0.1	± 1.1

Continuation of Calibration Certificate

Cert. No. : ACL23247

Job No. : VC66AC0085

Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	136.3	-0.1	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

Continuation of Calibration Certificate

Cert. No. : ACL23247
Job No. : VC66AC0085
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.7	0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

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

End of Calibration Certificate

Certificate of System Qualification

GC-OQ + GCMS-OQ

REVIEW BY Suchada T.APPROVED BY Tamratan M.NEXT CAL. DATE 18 Oct 24

System ID: GM-2
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Phatthanakan 40, Phattanakan Rd., Kheiswaeng Suan Luang, Khet Suan Luang, Bangkok 10250
Date: April 18, 2023 3:15:25 PM
EQP Name: AgilentRecommended , AgilentRecommended
EQP Revision: GC.02.51, GCMS.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 Accuracy

Name: 7890

Front MMI

Setpoint Status: Pass

	Setpoint	Actual
Inlet Pressure:	25.0 psi	25.0 psi
Accuracy:		0.0 psi
Agilent Recommended:	<=	1.2

Overall Inlet Pressure Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Date: April 18, 2023 3:15:25 PM
System ID: GM-2

Setpoint Status:	Pass			
Zone:	Oven			
	Setpoint/Actual			
Temperature:	230.0	230.1	°C	
Accuracy:		0.1	°C	
Agilent Recommended:	>=	-1.0	% setpoint in K	(-5.0 °C)
	<=	1.0	% setpoint in K	(5.0 °C)

Setpoint Status:	Pass			
Zone:	Oven			
	Setpoint/Actual			
Temperature:	100.0	100.4	°C	
Accuracy:		0.4	°C	
Agilent Recommended:	>=	-1.0	% setpoint in K	(-3.7 °C)
	<=	1.0	% setpoint in K	(3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name:	7890			
Setpoint Status:	Pass			
	Setpoint/Average			
Temperature:	100.0	100.4	°C	
Stability:		0.0	°C	
Agilent Recommended:	<=	0.5		

Overall GC Oven Temperature Stability Test Status

Pass

Log Amp

Tested Combination1	Front	MMI	/ External	SQ
Name:	5975C inert XL with TAD			
Setpoint Status:	Pass			

Date: April 18, 2023 3:15:25 PM
System ID: GM-2

Overall Log Amp Test Status

Pass

RFPA

Tested Combination1

Front

MMI

/ External

SQ

Name:

5975C inert XL with TAD

Setpoint Status:

Pass

Amu:

1050

m/z

Drift After Five Minutes:

4

mV

RFPA Voltage:

441

mV

Agilent Recommended:

>=

-100

and

<=

100

<=

1100

Overall RFPA Test Status

Pass

Tune EI

Tested Combination1

Front

MMI

/ External

SQ

Name:

5975C inert XL with TAD

Setpoint Status:

Pass

Filament:

1

Setpoint Status:

Pass

Filament:

2

Overall Tune EI Test Status

Pass

Scouting Run

Tested Combination1

Front

MMI

/ External

SQ

Injection Tower

Name:

7693A

Source:

EI - Inert

Date:

April 18, 2023 3:15:25 PM

System ID:

GM-2

Setpoint Status:

Completed

Injection Volume on Column:

1.0

uL

Overall Scouting Run Status

Completed

Signal to Noise EI

Tested Combination1	Front	MMI	/ External	SQ
---------------------	-------	-----	------------	----

Name: 5975C inert XL with TAD

Source: EI - Inert

Filament:

1

Setpoint Status:

Pass

Signal to Noise:

456

Agilent Recommended:

>=

320

Source: EI - Inert

Filament:

2

Setpoint Status:

Pass

Signal to Noise:

2034

Agilent Recommended:

>=

320

Overall Signal to Noise EI Test Status

Pass

Injection Precision

Tested Combination1	Front	MMI	/ External	SQ
---------------------	-------	-----	------------	----

Name: 7693A

Source: EI - Inert

Setpoint Status:

Pass

Injection Volume on Column:

1.0

uL

Area RSD:

1.66

%

Retention Time RSD:

0.04

%

Agilent Recommended:

<=

5.00

<=

1.00

Overall Injection Precision Test Status

Pass

Date: April 18, 2023 3:15:25 PM

System ID: GM-2

Mass Ratio Precision

Tested Combination1	Front	MMI	/ External	SQ
	Injection Tower			
Name:	7693A			
Source:	EI - Inert			
Setpoint Status:	Pass			

Injection Volume on Column: 1.0 uL

	Area Mass 1	Mass Ratio
	Abundance*s	
RSD:	1.66 %	0.39 %
Agilent Recommended:	<= 5.00	<= 5.00
	Pass	Pass

Overall Mass Ratio Precision Test Status

Pass

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	GM-2
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	External
LTM Included?	No

Sampler 1

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN10120123
Firmware Revision	A.10.08
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10

Sampler 2

Manufacturer	Agilent Technologies
Type	Tray
Name	7693A
Model Number	G4514A
Serial Number	CN10060099
Firmware Revision	A.10.16
Vial Heater	Not installed

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN10141049
Firmware Revision	A.01.16
Oven Type	Standard

Inlet 1

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

Detector 1

Manufacturer	Agilent Technologies
Name	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5975C inert XL with TAD
Serial Number	US10153217
Firmware Revision	5.02.12
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 logon 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:	Supasak Nimsongtham
Logged On User Name:	supasak.nimsongtham@agilent.com
Signature Creation Date:	April 18, 2023
Reason for Signature:	Executed protocol and published this original version of document

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User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-2
 Print Date: April 18, 2023 3:15:30 PM

ALS GM2 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 18, 2023 2:14:23 PM	Audit	SessionCreated	Session	None
April 18, 2023 2:14:23 PM	Start	Configuration	Session	None
April 18, 2023 2:14:23 PM	Audit	Entitlement	Licensing	User is FieldEngineer and does not require an unlock code
April 18, 2023 2:15:04 PM	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] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.51/GcMs.02.51.eqp], EQP File Name: [GcMs.02.51.eqp], EQP Name: [AgilentRecommended]
April 18, 2023 2:15:07 PM	End	Configuration	Session	None
April 18, 2023 2:15:11 PM	Start	Qualification	Session	OQ
April 18, 2023 2:15:11 PM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
April 18, 2023 2:17:27 PM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-2
 Print Date: April 18, 2023 3:15:30 PM

ALS GM2 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 18, 2023 2:17:28 PM	Start	Execution	Inlet Pressure Accuracy - Front MMI: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
April 18, 2023 2:17:33 PM	End	Execution	Inlet Pressure Accuracy - Front MMI: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
April 18, 2023 2:17:36 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
April 18, 2023 2:18:00 PM	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
April 18, 2023 2:18:01 PM	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
April 18, 2023 2:18:03 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
April 18, 2023 2:18:20 PM	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
April 18, 2023 2:18:22 PM	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
April 18, 2023 2:18:44 PM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None

User Name: supasak.nlmsongtham
 Hostname: 5CG1115HKC

System Id: GM-2
 Print Date: April 18, 2023 3:15:30 PM

ALS GM2 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 18, 2023 2:19:31 PM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
April 18, 2023 2:19:33 PM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
April 18, 2023 2:19:36 PM	Start	Execution	Log Amp - 5975C inert XL with TAD SQ: - Source: EI - Inert	None
April 18, 2023 2:19:46 PM	End	Execution	Log Amp - 5975C inert XL with TAD SQ: - Source: EI - Inert	Run Count : 1
April 18, 2023 2:19:49 PM	Start	Execution	RFPA - 5975C inert XL with TAD SQ: - Source: EI - Inert	None
April 18, 2023 2:32:54 PM	End	Execution	RFPA - 5975C inert XL with TAD SQ: - Source: EI - Inert	Run Count : 1
April 18, 2023 2:32:57 PM	Start	Execution	Tune EI - 5975C inert XL with TAD SQ: - Source: - EI - Inert Filament 1 (Qualitative - No setpoints associated)	None
April 18, 2023 2:34:05 PM	End	Execution	Tune EI - 5975C inert XL with TAD SQ: - Source: - EI - Inert Filament 1 (Qualitative - No setpoints associated)	Run Count : 1
April 18, 2023 2:34:07 PM	Start	Execution	Tune EI - 5975C inert XL with TAD SQ: - Source: - EI - Inert Filament 2 (Qualitative - No setpoints associated)	None
April 18, 2023 2:34:20 PM	End	Execution	Tune EI - 5975C inert XL with TAD SQ: - Source: - EI - Inert Filament 2 (Qualitative - No setpoints associated)	Run Count : 1

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-2
 Print Date: April 18, 2023 3:15:30 PM

ALS GM2 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 18, 2023 2:34:23 PM	Start	Execution	Scouting Run - Injection Tower, Front MMI, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	None
April 18, 2023 2:34:56 PM	Audit	Data	Scouting Run - Injection Tower, Front MMI, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	Data files Path : E:\GM-2 OQ2023\SNF1_001.D\DATA. MS
April 18, 2023 2:35:12 PM	End	Execution	Scouting Run - Injection Tower, Front MMI, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	Run Count : 1
April 18, 2023 2:35:13 PM	Start	Execution	Signal to Noise EI - Injection Tower, Front MMI, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	None
April 18, 2023 2:35:24 PM	Audit	Data	Signal to Noise EI - Injection Tower, Front MMI, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	Data files Path : E:\GM-2 OQ2023\SNF1_001.D\DATA. MS
April 18, 2023 2:35:45 PM	End	Execution	Signal to Noise EI - Injection Tower, Front MMI, SQ: - Source: EI - Inert using Filament 1 - L: >= 320	Run Count : 1
April 18, 2023 2:35:47 PM	Start	Execution	Signal to Noise EI - Injection Tower, Front MMI, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	None
April 18, 2023 2:35:52 PM	Start	Execution	Injection Precision - Injection Tower, Front MMI, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	None

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-2
 Print Date: April 18, 2023 3:15:30 PM

ALS GM2 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 18, 2023 2:36:20 PM	Audit	Data	Injection Precision - Injection Tower, Front MMI, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\GM-2 OQ2023\IPMRP\IP_MRP002. D\DATA.MS
April 18, 2023 2:36:20 PM	Audit	Data	Injection Precision - Injection Tower, Front MMI, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\GM-2 OQ2023\IPMRP\IP_MRP003. D\DATA.MS
April 18, 2023 2:36:20 PM	Audit	Data	Injection Precision - Injection Tower, Front MMI, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\GM-2 OQ2023\IPMRP\IP_MRP004. D\DATA.MS
April 18, 2023 2:36:20 PM	Audit	Data	Injection Precision - Injection Tower, Front MMI, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\GM-2 OQ2023\IPMRP\IP_MRP005. D\DATA.MS
April 18, 2023 2:36:20 PM	Audit	Data	Injection Precision - Injection Tower, Front MMI, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\GM-2 OQ2023\IPMRP\IP_MRP006. D\DATA.MS
April 18, 2023 2:36:21 PM	Audit	Data	Injection Precision - Injection Tower, Front MMI, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : E:\GM-2 OQ2023\IPMRP\IP_MRP007. D\DATA.MS
April 18, 2023 2:36:42 PM	End	Execution	Injection Precision - Injection Tower, Front MMI, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Run Count : 1
April 18, 2023 2:36:45 PM	Start	Execution	Mass Ratio Precision - Injection Tower, Front MMI, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	None

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-2
 Print Date: April 18, 2023 3:15:30 PM

ALS GM2 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 18, 2023 2:37:04 PM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : E:\GM-2 OQ2023\IPMRP\IP_MRP002. D\DATA.MS
April 18, 2023 2:37:04 PM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : E:\GM-2 OQ2023\IPMRP\IP_MRP003. D\DATA.MS
April 18, 2023 2:37:04 PM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : E:\GM-2 OQ2023\IPMRP\IP_MRP004. D\DATA.MS
April 18, 2023 2:37:04 PM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : E:\GM-2 OQ2023\IPMRP\IP_MRP005. D\DATA.MS
April 18, 2023 2:37:06 PM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : E:\GM-2 OQ2023\IPMRP\IP_MRP006. D\DATA.MS
April 18, 2023 2:37:06 PM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : E:\GM-2 OQ2023\IPMRP\IP_MRP007. D\DATA.MS
April 18, 2023 2:37:17 PM	End	Execution	Mass Ratio Precision - Injection Tower, Front MMI, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Run Count : 1
April 18, 2023 2:37:23 PM	Start	Execution	Signal to Noise EI - Injection Tower, Front MMI, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	None

User Name: supasak.nlmsongtham
 Hostname: SCG1115HKC

System Id: GM-2
 Print Date: April 18, 2023 3:15:30 PM

ALS GM2 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 18, 2023 2:56:38 PM	Start	Execution	Signal to Noise EI - Injection Tower, Front MMI, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	None
April 18, 2023 2:57:00 PM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over
April 18, 2023 2:57:16 PM	Audit	Data	Signal to Noise EI - Injection Tower, Front MMI, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	Data files Path : E:\GM-2 OQ2023\SNF2_003.D\DATA. MS
April 18, 2023 2:57:58 PM	Start	Execution	Signal to Noise EI - Injection Tower, Front MMI, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	None
April 18, 2023 2:58:05 PM	End	Execution	Signal to Noise EI - Injection Tower, Front MMI, SQ: - Source: EI - Inert using Filament 2 - L: >= 320	Run Count : 1
April 18, 2023 3:01:14 PM	End	Qualification	Session	OQ
April 18, 2023 3:01:14 PM	Start	Reporting	Session	None
April 18, 2023 3:14:47 PM	Audit	Reporting	Session	Report Generated : Certificate

SITHIPHORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY



451-451/1 Sirinthorn Rd.,Bangbumru, Bangplud Bangkok 10700 THAILAND.
Tel.0-2435-8800 Fax.0-2433-1679 e-mail:cal-center@sithiphorn.com http://www.sithiphorn.com

NSC-TISI-TIS 17025
CALIBRATION 0394

Cert. No. : ACL23038

Pages : 1 of 9

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-21/ Microphone UC-52 / Preamplifier NH-21
Serial No.: 00465461 / 108081 / 19513
ID No.: RYG_FS0007

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAEANG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location : -
Ambient Temperature : (23.0 \pm 3) °C
Pressure : (101.3 \pm 3) kPa
Relative Humidity : (50.0 \pm 20) %

Received Date : 06 JANUARY 2023
Calibration Date : 13-18 JANUARY 2023
Date of Issue : 19 JANUARY 2023

REVIEW BY	Narakorn P.
APPROVED BY	[Signature]
NEXT CAL. DATE	13/1/24

Calibrated by : Nathakorn Pisutpaisan

Approved by :

[Signature]
(Thanakul Petchurai)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Continuation of Calibration Certificate

Cert. No. : ACL23038
Job No. : VC66AC0024
Pages : 2 of 9

Calibration Procedure : CP-AC-02

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).

The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	8846A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23

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

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

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACL23038
Job No. : VC66AC0024
Pages : 3 of 9

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.4	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

Continuation of Calibration Certificate

Cert. No. : ACL23038

Job No. : VC66AC0024

Pages : 4 of 9

Result of calibration :**1. Absolute sensitivity**

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
23.5

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	22.2
C - weight	21.6
Flat	22.2

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			Acceptance Limits
	Flat	C-weight	A-weight	
125	0.2	0.2	0.2	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	0.1	0.2	0.2	±5.0

Continuation of Calibration Certificate

Cert. No. : ACL23038

Job No. : VC66AC0024

Pages : 5 of 9

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	0.0	±2.0
125	-0.1	-0.1	-0.1	±1.5
250	-0.1	-0.1	-0.1	±1.5
500	-0.1	-0.1	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.1	0.1	0.0	±2.0
4000	0.1	0.0	0.0	±3.0
8000	0.1	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

Continuation of Calibration Certificate

Cert. No. : ACL23038

Job No. : VC66AC0024

Pages : 6 of 9

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1

Continuation of Calibration Certificate

Cert. No. : ACL23038

Job No. : VC66AC0024

Pages : 7 of 9

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±0.5
120	94.0	94.0	0.0	±0.5
110	94.0	94.0	0.0	±0.5
100	94.0	94.0	0.0	±0.5
90	94.0	94.0	0.0	±0.5

Level linearity on each level range

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	43.0	43.0	0.0	±0.5
120	33.0	32.6	-0.4	±0.5

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

Continuation of Calibration Certificate

Cert. No. : ACL23038

Job No. : VC66AC0024

Pages : 8 of 9

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{cpeak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	135.9	-0.5	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.0	-0.4	±2.0
Negative half cycle	135.4	135.0	-0.4	±2.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.4	89.3	-0.1	±1.5

Continuation of Calibration Certificate

Cert. No. : ACL23038

Job No. : VC66AC0024

Pages : 9 of 9

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

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

_____ End of Calibration Certificate _____

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Sirinthorn Rd.,Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel.0-2435-8800 Fax.0-2433-1679 e-mail:cal-center@sithiphorn.com http://www.sithiphorn.com



Cert. No. : ACL23009

Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 01122579 / 172172 / 74022
ID No.: RYG_FS0018

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWANG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location : -
Ambient Temperature : (23.0 \pm 3) °C
Pressure : (101.3 \pm 3) kPa
Relative Humidity : (50.0 \pm 20) %

Received Date : 14 DECEMBER 2022
Calibration Date : 03-05 JANUARY 2023
Date of Issue : 06 JANUARY 2023

REVIEW BY	<i>Nathakorn P.</i>
APPROVED BY	<i>[Signature]</i>
NEXT CAL. DATE	3/9/23 WPK

24

Calibrated by : Nathakorn Pisutpaisan

Approved by :

[Signature]
(Thanakul Petchurai)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Continuation of Calibration Certificate

Cert. No. : ACL23009

Job No. : VC66AC0021

Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).

The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23

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

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

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACL23009
Job No. : VC66AC0021
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

Continuation of Calibration Certificate

Cert. No. : ACL23009

Job No. : VC66AC0021

Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.1

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	12.0
C - weight	20.1
Flat	26.6

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			Acceptance Limits
	Flat	C-weight	A-weight	
125	0.0	0.1	0.1	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	0.1	0.1	0.1	±5.0

Continuation of Calibration Certificate
Cert. No. : ACL23009
Job No. : VC66AC0021
Pages : 5 of 8
4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.1	±2.0
4000	0.0	0.1	0.1	±3.0
8000	0.1	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz
5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.1	0.1	± 0.3

Continuation of Calibration Certificate

Cert. No. : ACL23009

Job No. : VC66AC0021

Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.1	0.1	± 1.1
134.0	134.1	0.1	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.1	0.1	± 1.1
114.0	114.1	0.1	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.1	0.1	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.8	-0.2	± 1.1

Continuation of Calibration Certificate

Cert. No. : ACL23009
Job No. : VC66AC0021
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	116.9	-0.1	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	107.9	-0.1	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.8	-0.2	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.3	-0.1	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

Continuation of Calibration Certificate

Cert. No. : ACL23009

Job No. : VC66AC0021

Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

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

End of Calibration Certificate

CERTIFICATE OF CALIBRATION

ISSUED BY

Cirrus Research plc

DATE OF ISSUE

05 January 2023

CERTIFICATE NUMBER 185460

REVIEW BY

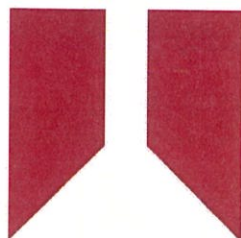
Monika P

APPROVED BY

[Signature]

NEXT CAL. DATE

5/1/24



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1

Test engineer:

Terry Goodrich

Electronically signed:

T. A. Goodrich

doseBadge Reader

Instrument

Manufacturer: Cirrus Research plc

Serial Number: 89107

Model Number: RC:110A

Notes:

Calibration Procedure

The tests were carried out in accordance with the requirements of IEC 60942:2003 where applicable.

Date of Calibration: 05 January 2023

Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

Calibration Results

	Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Result	113.97	1002.2	0.13
Uncertainty	± 0.11	± 0.14	± 0.10
Tolerances	± 0.60	± 2.00	± 4.00

No adjustments were made during this calibration.

Environmental Conditions

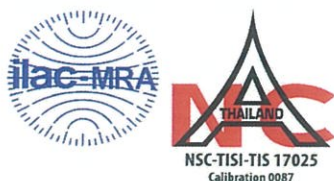
Pressure: 100.38 kPa

Temperature: 23.6 °C

Humidity: 41.7 %

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%.



Certificate of Calibration

Equipment:	SPECTROPHOTOMETER	Certificate No.:	C06230441
Model:	DR6000	Issued Date:	19 September 2023
Serial No. (or ID.):	1627845 (RYG_EN0037)	Job No.:	WO-00005382
Manufacturer:	HACH	Page:	1 of 3
Condition:	In Condition		

Customer: ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
616/10 Moo 5 T.Maenam Khu,
A.Pluakdaeng, Rayong 21140, Thailand.

Environment Condition:

Temperature	23.9	°C	±	0.2
Humidity	65.3	%RH	±	1.4

REVIEW BY	<i>N. Banerjee</i>
APPROVED BY	<i>D. [Signature]</i>
NEXT CAL. DATE	18/3/25

Calibration Place: ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch) (Wet Chemistry)
616/10 Moo 5 T.Maenam Khu,
A.Pluakdaeng, Rayong 21140, Thailand.

Calibration By: Mr.Nattapat Rungrueng

Calibration Date: 18 September 2023

The Method used: In house method, CAL-WI-24, base on ASTM E 275-08 and ASTM E 387-04

Traceability: This certificate is traceable to the CRM maintained by National Institute of Standards and Technology (NIST) through Starna Scientific Limited.

The standard for Wavelength Certificate No. 111583 and 111584
The standard for Photometric Certificate No. 9114984 and 111588
The standard for Stray light Certificate No. 111586 and 111585
The standard for Spectral resolution Certificate No. 111587

[Signature]
(Mr. Nattapat Rungrueng)
Person in charge

[Signature]
(Mr. Nitinun Srihawan)
Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร 10260
2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Calibration Results:

Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of Std at 2 nm and UUC at 2 nm

Standard Wavelength	Unit Under Calibration	Correction	Uncertainty
418.61	418.3	0.31	0.13
536.66	536.6	0.06	0.13
637.98	638.3	-0.32	0.13
748.48	748.7	-0.22	0.13
807.03	807.4	-0.37	0.13

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.2930	0.289	0.0040	0.0045
	0.5168	0.519	-0.0022	0.0045
	1.0298	1.029	0.0008	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.2867	0.283	0.0037	0.0045
	0.5073	0.509	-0.0017	0.0045
	1.0083	1.007	0.0013	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.2516	0.250	0.0016	0.0045
	0.4595	0.462	-0.0025	0.0045
	0.9334	0.933	0.0004	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.2461	0.245	0.0011	0.0045
	0.4652	0.466	-0.0008	0.0045
	0.9468	0.946	0.0008	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.2594	0.259	0.0004	0.0045
	0.5040	0.505	-0.0010	0.0045
	1.0032	1.002	0.0012	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.2579	0.257	0.0009	0.0045
	0.4971	0.497	0.0001	0.0045
	0.9720	0.971	0.0010	0.0045

Calibration Results:
Without Adjustment
Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
235 nm	0.0000	0.000	0.0000	0.0080
	0.7355	0.737	-0.0015	0.0080
257 nm	0.0000	0.000	0.0000	0.0080
	0.8574	0.857	0.0004	0.0080
313 nm	0.0000	0.000	0.0000	0.0080
	0.2864	0.290	-0.0036	0.0080
350 nm	0.0000	0.000	0.0000	0.0080
	0.6374	0.637	0.0004	0.0080

Stray light *

Standard: cut-off	UUC: Wavelength (nm)	UUC: Transmission (%T)	Absorbance (A)
260.62 +/- 0.11 nm	260.6	1.3	1.886
391.44 +/- 0.11 nm	391.4	1.3	1.886

Spectral Resolution *

Nominal Concentration 0.02 % v/v	Peak	Trough	Ratio	SBW
Standard Wavelength (nm)	268.66	266.69	1.38	2.00
UUC: Wavelength (nm)	268.2	266.1		
Std Absorbance (A)	0.4566	0.2780		
Absorbance (A)	0.413	0.300		

* Calibration Marked " Not TISI Accredited " in this Certificate have been included for completeness.

The End of Certificate

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: WO-00005382

ชนิดเครื่องมือ: SPECTROPHOTOMETER

รุ่น: DR6000

หมายเลขเครื่อง: 1627845

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
18 Sep 2023			18 Sep 2023		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิทช์ ปิด – เปิด เครื่อง (On-Off Swicth)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		Spectrophotometer			
<input type="checkbox"/>	<input type="checkbox"/>	6. แรงดันไฟฟ้า (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ตัวหมุนเลือกความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	*
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	9.2 Hours
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	741.5 Hours
<input checked="" type="checkbox"/>	<input type="checkbox"/>	11. ช่องวัดหลายตัวอย่าง (Carousel Module)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		pH Meter and Conductivity Meter			
<input type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด (Electrode and Connection Cable)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	13. ระดับสารละลายใน Electrode (Level KCl)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	15. ขาจับอิเล็กโทรด (Stand)	<input type="checkbox"/>	<input type="checkbox"/>	
		Turbidimeter			
<input type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นที่ต่ำสุด (No Sample)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการส่องสว่างของแสง (>= 2.5 ไม่เกิน 3.0)	<input type="checkbox"/>	<input type="checkbox"/>	
		Automatic titrator			
<input type="checkbox"/>	<input type="checkbox"/>	18. สภาพ Piston Burettes	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>	

เพิ่มเติม/ข้อแนะนำ : *656.1nm=656.1nm

*486.0nm=485.5nm

Mr.Nattapat Rungruang

Service Engineer



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TEL. 0-2717-3000-27 FAX. 0-2719-9484

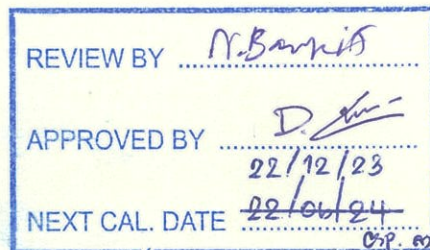


Cert.No.: 22CH1733

Page.: 1 of 3

Certificate of Calibration

Equipment :	pH Meter
Manufacturer :	Mettler Toledo
Model :	SevenExcellence
Serial No. :	B834291445
ID No. :	RYG_EN0152
Condition As-Received:	Used Item
Received Date :	21 December 2022
Calibration Date :	22 December 2022
Reference :	2212-0602DSC-1
Submitted by :	ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch 616/10 Moo 5 T.Maenam Khu, A.Pluakdaeng, Rayong 21140, Thailand
Ambient Temperature :	(25 ± 2.5) °C
Relative Humidity :	(50 ± 15) %
Calibration Procedure :	In - house method : - CP-CH5 by direct measurement with standard voltage calibrator and direct measurement with certified reference material (CRM) - CP-CH8 by comparison with standard thermometer



Calibrated by : Warakorn Lerngatrakul

Approved by :

Malu.

Approved Signatory

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

Issue Date : 26 December 2022

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0048758



Cert.No.: 22CH1733

Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument : -

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Document Process Calibrator	54030049	130RC116	22E2769	24 Aug 2023
2) Ref. Standard Thermometer	4982054	110RC044	22I1306	27 Oct 2023

This certification is traceable to the International System of Unit maintained at:-

- Traceable to National Institute of Metrology (Thailand), NIMT

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 4.008	CPA chem	826588	09 July 2024
pH 6.987	CPA chem	823322	20 June 2023
pH 10.008	CPA chem	826590	09 July 2023

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

Calibration Results

Function : mV Measurement

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

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor <i>k</i>
	pH	mV	mV	pH		
pH Meter S/N.: B834291445	4.000	177.48	177.3	4.000	0.058	2.00
	7.000	0.00	-0.1	7.000	0.058	2.00
	10.000	-177.48	-177.5	10.000	0.058	2.00

Malu



Cert.No.: 22CH1733

Page.: 3 of 3

Calibration Results**Function : pH Measurement**

Performing three buffers standard curve by using buffer nominal pH (4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (\pm)	Coverage factor k
pH Electrode	4.008	4.011	185.2	0.0052	2.06
S/N.: 1475518	6.987	6.990	10.4	0.0088	2.00
	10.008	10.014	-166.5	0.0072	2.00

Function : Temperature Measurement**(*) Without adjustment**

This equipment was connected with Temperature Probe;

- Model : InLab Expert Pro-ISM

- Serial No. : 1475518

Dimension of probe;

- Length : 120 mm.

- Diameter : 12 mm.

- Immersion Depth : 100 mm.

Calibration Point ($^{\circ}\text{C}$)	Standard Temperature ($^{\circ}\text{C}$)	UUC* Reading ($^{\circ}\text{C}$)	Error ($^{\circ}\text{C}$)	Uncertainty of measurement (\pm $^{\circ}\text{C}$)	Coverage factor k
25.0	25.001	24.9	-0.101	0.13	2.00

Remark : - UUC* = Unit Under Calibration

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 %.

-o0o-

Malu



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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Certificate of Calibration

Certificate No. : 22E4098

Page : 1 of 2

Equipment : pH Meter
Manufacturer: Mettler Toledo
Model : SevenExcellence
Serial No.: B834291445
ID No.: RYG_EN0152

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except with the prior written approval of the head of
Corporate Services 3: Equipment Calibration and Testing Services.

Condition As-Received: Used Item
Received Date: 21 December 2022
Calibration Date: 23 December 2022

Reference: 2212-0602DSC
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 10) %

Submitted by: ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch
616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng,
Rayong 21140, Thailand

Procedure used: Calibration were conducted using In-house calibration Procedure CP-E17 According to direct measurement method with Multi-Product Calibrator.

Condition of this result of calibration

1.Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Multi-Product Calibrator	5500A	6315011	22E1431	05 May 2023

2.This result of calibration was made on requested at the point specified by customer.

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

4.This Certification is traceable to the International System of Unit maintained at:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Wutchareeporn Wongchutikrane
Issue Date : 26 December 2022

Approved Signatory :

☒ Phalinee Prabpaipal

[] Nuntawat Khamchai

[] Pornthippa Tameyakul

B 0304803



Cert. No.: 22E4098

Page.: 2 of 2

Result of calibration :- (*) Without adjustment () After adjustment

Function:	DC voltage measuremer		Range:	2000	mV	
<u>Standard Value</u>		<u>UUC* Reading</u>		<u>Error</u>		<u>Uncertainty</u>
(mV)		(mV)		(mV)		($\pm \mu V$)
-200.0000		-200.0		0.0		72
-150.0000		-150.0		0.0		69
-100.0000		-100.0		0.0		65
-50.0000		-50.0		0.0		62
0.0000		0.0		0.0		58
50.0000		50.0		0.0		62
100.0000		100.0		0.0		65
150.0000		150.0		0.0		69
200.0000		199.9		-0.1		72

The 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 %

*UUC= Unit Under Calibration.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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Cert.No.: 23TW168

Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
Manufacturer : YSI
Model : 5000-115V
Serial No. : 15E102796
ID No. : RYG_EN0032
Received Date : 21 July 2023
Test Date : 24 July 2023
Reference : 2307-0713DSC-1
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
Rayong Branch
616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng,
Rayong 21140, Thailand

REVIEW BY	<i>N. Bam</i>
APPROVED BY	<i>D. Sirithan</i>
NEXT CAL. DATE	24/01/25

Laboratory Condition : Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure : In - house method : CP-CH9
by Comparison Technique with Azide Modification Method

Tested by : Walalak Sirithean

Approved by : *Saithip*
Approved Signatory

- () Malee Butkruea
(✓) Saithip Meangmai
() Warakorn Lerngagtrakul

Issue Date : 26 July 2023



Cert.No.: 23TW168

Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

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

<u>Instruments</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Burette	-	130BU10	23CG1172	22 Mar 2025
2) Balance	1126143764	140RC004	22MM50	20 Sep 2023

2. Standard Material :-

<u>Material</u>	<u>Manufacturer</u>	<u>Lot.No.</u>	<u>Assay</u>
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: 15E100464

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.18	8.17	0.0055

This report was certified only for the instrument we tested. It is allowable to use for study the system efficiency, The environmental impact control and present to organization it may concerned. Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced other in full, without written approval of the laboratory

-o0o-

Saitthip

a 1172155



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Cert. No.: 23LM125

Page.: 1 of 2

Certificate of Calibration

Equipment : DO Meter with Sensor

Manufacturer : YSI

Model : 5000-115V

Serial No. : 15E102796

ID No. : RYG_EN0032

Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
Rayong Branch
616/10 Moo 5 T. Maenam Khu, A. Pluakdaeng,
Rayong 21140 Thailand

Location : TPA On Site Calibration Laboratory

Received Order : 25 July 2023


Calibrated Date : 27 July 2023

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

AC Line Voltage : (220 ± 22) V

Calibrated by : Preecha Hlahib

Approved by : 
Approved Signatory

() Pornthippa Tameyakul
() Malee Butkruea
☒ Suwit Imjai

Issue Date : 31 July 2023

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0053616



Equipment : DO Meter with Sensor
Condition As-Received : Used Item
Reference : 2307-0713DSC-2

Cert. No.: 23LM125
Page.: 2 of 2

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

<u>Instrument</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Traceable</u>	<u>Due Date</u>
1) Digital Thermometer	2188080	2211285	TPA	21 Oct 2023

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function : Temperature measurement.

This instrument was connected with temperature sensor, S/N.: 1228475367

<u>Calibration Point</u> (°C)	<u>Immersion Depth</u> (mm)	<u>Standard Temperature</u> (°C)	<u>UUC* Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty</u> (± °C)	<u>Coverage Factor</u> <i>k</i>
20.00	100	20.011	19.91	-0.101 *	0.15	2.00

UUC* : Unit Under Calibration

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

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Yen!



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Cert. No.: 23TM962

Page : 1 of 3

Certificate of Calibration

Equipment : Low Temp. Incubator

Manufacturer : Memmert

Model : IPP750

Serial No. : V818.0084

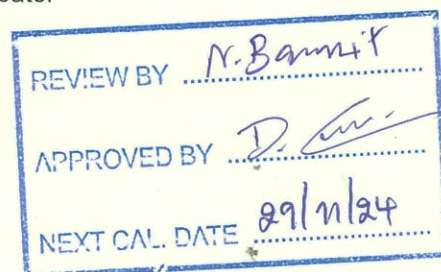
ID No. : RYG_EN0154

Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
(Rayong Branch)
616/10 Moo 5 T. Maenam Khu,
A. Pluakdaeng, Rayong 21140 Thailand

Location : BOD Room

Received Order : 29 May 2023
Calibration Date : 29 May 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %

Calibrated by : Man Pattanapongpaiboon



Approved by :

Approved Signatory

- () Pornthippa Tameyakul
() Malee Butkruea
(✓) Suwit Imjai

Issue Date :

7 June 2023

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0054967



Equipment : Low Temp. Incubator
Condition As-Received : Used Item
Reference : 2305-0898OC-2

Cert. No.: 23TM962

Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Data Acquisition	34972A	MY57013711	22LM93	02 Jul 2023

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

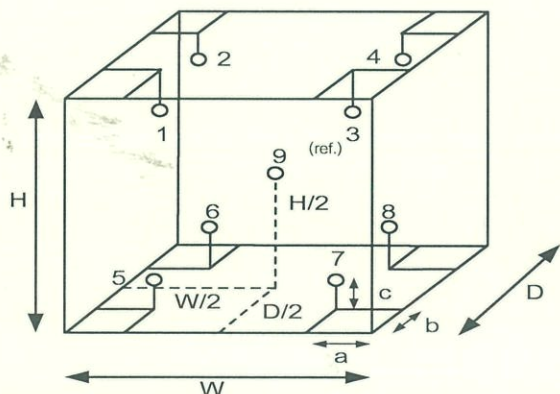
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	23	23
REL.Humid. (%)	54	56
AC Supply (Volt)	223	222



Position :	Ref. Std. ID No.:
1	18-18RTD-01
2	18-18RTD-02
3	18-18RTD-03
4	18-18RTD-04
5	18-18RTD-05
6	18-18RTD-10
7	18-18RTD-07
8	22-18RTD-08
9 (ref.)	18-18RTD-09

Probe Installation Details :

a = 10 cm
b = 10 cm
c = 10 cm

Dimension of Chamber :

D = 0.60 m
W = 1.0 m
H = 1.2 m
Capacity = 0.75 m³

Signature



Equipment : Low Temp. Incubator
Condition As-Received : Used Item
Reference : 2305-0898OC-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 23TM962

Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor <i>k</i>
20.0	20.0	20.0	0.019	0.72	1.0	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (±°C)
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	19.547	19.780	19.487	19.529	19.408	20.139	20.112	20.406	20.116	0.30

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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 %.

-o0o-

Sevrit

Sartorius (Thailand) Co., Ltd.

129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310

Tel: +66 2643 8361-6, e-mail: service.thailand@sartorius.com



NSC-TISI-TIS 17025

CALIBRATION 0426

SARTORIUS

Certificate

of Calibration

REVIEW BY	Thavitall.
APPROVED BY	D. [Signature]
NEXT CAL. DATE	01/03/24

Model Number : MSE224S-100-DU

Description : Analytical Balance

Serial Number : 0026207038

ID No. : RYG_EN0002

Manufacturer : Sartorius

Certificate No. : 23BCI0112

Issued Date : Friday, March 03, 2023

Reference No. : 204833

Page No. : 1 of 2

Customer Name : ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5 T.Maenam Khu, A.Pluak Daeng, Rayong 21140, Thailand.

Calibrated Place : ALS Laboratory Group (Thailand) Co., Ltd.(Balance Room)
616/10 Moo 5 T.Maenam Khu, A.Pluakdaeng, Rayong.21140, Thailand.

Calibrated By : Mr.Chonchai Inthana

Calibration Date : Wednesday, March 01, 2023

Calibration
 Procedure No. : This calibration was conducted by
Using in-house calibration procedure number (WI-003)
Based on UKAS LAB 14 : 2019

Metrological data :

Capacity : 220 g Readability : 0.0001 g

Ambients Conditions:

Temperature : 23.6 °C ± 5.0 °C
 Humidity : 60.0 % RH ± 10.0 % RH
 Pressure : — ± —

Reasons for calibration

☐ New Installation ☐ Service / Repaired ☒ Re-calibration/ Maintenance

Equipment Condition: ☒ Good Operate ☐ Fair

Measurement Method UKAS Publication Ref :Lab 14

The measurement uncertainty stated is the expended uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM). The calibration certificate documents the traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came form list of Sartorius Metrological Specifications.

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 5000g E2,YCS011-522-00	SPC-RT	C02212565	14-Sep-2023
MHB-382SD	Humidity/Barometer/Temp Lutron MHB-382SD	DKSH	C19220444	5-Sep-2023

This certificate relate and apply this equipment only.

This certificate may not be reproduced other than in full except with the prior written approval of the Verification Operation Division Sartorius (Thailand) Co., Ltd.

Mr.chonchai Inthana(Technical Manager)

S
T
A
M
P

Certificate of Calibration

Model Number : MSE224S-100-DU

Certificate No. : 23BCI0112

Description : Analytical Balance

Issued Date : Friday, March 03, 2023

Serial Number : 0026207038

Reference No. : 204833

ID No. : RYG_EN0002

Manufacturer : Sartorius

Page No. : 2 of 2

Calibration Results : Without Adjustment

Repeatability

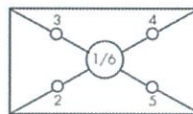
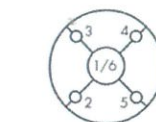
The reproducibility is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.

Nominal Value : (Low Load)	20.0000	199.9999
20 g	20.0000	200.0000
Tolerance	20.0000	199.9999
0.0001 g	20.0000	200.0000
	20.0000	199.9999
Nominal Value : (High Load)	20.0000	199.9999
200 g	19.9999	200.0000
Tolerance	20.0000	200.0000
0.0001 g	20.0000	199.9999
	20.0000	200.0000
Standard Deviation	0.00003	0.00005

Eccentricity (Off-center loading error)

The off-center loading error is yielded by the difference between the readout of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R76).

Nominal value : 100 g
Tolerance 0.0004 g



	Difference
1	—
2	-0.0001
3	-0.0001
4	0.0001
5	0.0002
6	-

Linearity

The linearity, also called linearity error. Describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

Tolerance 0.0002 g

Nominal Value (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
0.01	0.0100	0.0100	0.0000	0.00014
0.05	0.0500	0.0500	0.0000	0.00014
0.1	0.1000	0.1000	0.0000	0.00014
0.5	0.5000	0.5000	0.0000	0.00014
1	1.0000	1.0000	0.0000	0.00014
5	5.0000	5.0000	0.0000	0.00014
10	10.0000	10.0001	0.0001	0.00014
20	20.0000	20.0000	0.0000	0.00024
50	50.0000	50.0000	0.0000	0.00015
100	100.0000	99.9999	-0.0001	0.00019
200	200.0000	200.0000	0.0000	0.00032

End of Report.



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TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 22TM1517

Page : 1 of 3

Certificate of Calibration

Equipment :	Hot Air Oven
Manufacturer :	Memmert
Model :	UFE 500
Serial No. :	G511.1572
ID No. :	RYG_EN0010
Submitted by :	ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch) 616/10 Moo 5 T. Maenam Khu, A. Pluakdaeng, Rayong 21140 Thailand
Location :	Oven Room
Received Order :	20 October 2022
Calibration Date :	20 October 2022
Ambient Temperature :	(26 ± 10) °C
Relative Humidity :	(50 ± 30) %
Calibrated by :	Man Pattanapongpaiboon

REVIEW BY Thanitall.
APPROVED BY D. [Signature]
NEXT CAL. DATE 20/04/24

Approved by :

Malu.

Approved Signatory

- () Pornthippa Tameyakul
(✓) Malee Butkruea
() Suwit Imjai

Issue Date :

2 November 2022

The Uncertainties are for a confidence probability of approximately 95%

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



Equipment : Hot Air Oven
 Condition As-Received : Used Item
 Reference : 2210-0376OC-2

Cert. No.: 22TM1517
 Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY49023932	22LM97	29 Jul 2023

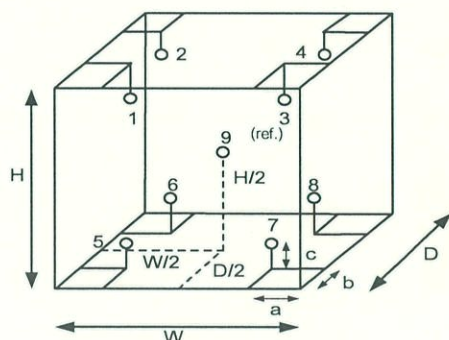
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close



Environment during calibration		
	Beginning	Finished
Temp. (°C)	25	25
REL.Humid. (%)	54	59
AC Supply (Volt)	223	225

Ref. Std. ID No.: @ Calibration Point

Position :	(180) °C	(104) °C
1	21-16TC-01	20-16RTD-01
2	21-16TC-02	20-16RTD-02
3	21-16TC-03	20-16RTD-03
4	21-16TC-04	20-16RTD-04
5	21-16TC-05	22-16RTD-05
6	21-16TC-06	20-16RTD-06
7	21-16TC-07	20-16RTD-07
8	21-16TC-08	22-16RTD-08
9 (ref.)	21-16TC-09	22-16RTD-09

Probe Installation Details :

Dimension of Chamber :

a =	5.0	cm	D =	0.40	m
b =	5.0	cm	W =	0.56	m
c =	5.0	cm	H =	0.48	m
			Capacity =	0.11	m ³

Malu



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2210-0376OC-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 22TM1517

Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor <i>k</i>
104.0	104.0	104.0	0.076	0.52	0.60	0.42	2
180.0	180.0	180.0	0.13	0.88	1.2	1.1	2

Calibration Point (°C)	Measured Temperature (°C)								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
104.0	103.768	103.734	103.723	103.800	104.215	104.131	104.132	103.740	103.747
180.0	179.723	179.359	179.439	179.489	180.361	180.114	180.131	180.243	179.605

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

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Malu .



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TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 22TM1492

Page : 1 of 3

Certificate of Calibration

Equipment :	Hot Air Oven
Manufacturer :	Memmert
Model :	UM 400
Serial No. :	b495.0899
ID No. :	RYG_EN0006
Submitted by :	ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch) 616/10 Moo 5, T. Maenam Khu, A. Pluakdaeng, Rayong 21140, Thailand
Location :	Oven Room
Received Order :	20 October 2022
Calibration Date :	20 October 2022
Ambient Temperature :	(26 ± 10) °C
Relative Humidity :	(50 ± 30) %
Calibrated by :	Preecha Hlahib
Approved by :	<u>Malu.</u> Approved Signatory
(<input checked="" type="checkbox"/>) Pornthippa Tameyakul	
(<input checked="" type="checkbox"/>) Malee Butkruea	
(<input type="checkbox"/>) Suwit Imjai	



Issue Date : 2 November 2022

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2210-0376OC-1

Cert. No.: 22TM1492

Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34970A	MY44035217	21LM30	23 Dec 2022

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

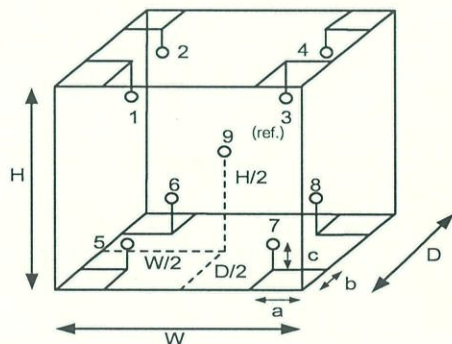
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	28	29
REL.Humid. (%)	43	47
AC Supply (Volt)	220	221



Probe Installation Details :

a = 5.0 cm
b = 5.0 cm
c = 5.0 cm

Dimension of Chamber :

D = 0.33 m
W = 0.40 m
H = 0.40 m
Capacity = 0.053 m³

Position :	Ref. Std. ID No.:
1	18-10RTD-01
2	18-10RTD-02
3	18-10RTD-03
4	18-10RTD-04
5	18-10RTD-05
6	18-10RTD-06
7	18-10RTD-07
8	18-10RTD-08
9 (ref.)	18-10RTD-09

Malu .



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2210-0376OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 22TM1492

Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor <i>k</i>
70.0	70.0	70.0	0.079	0.47	0.77	0.42	2

Calibration Point (°C)	Measured Temperature (°C)								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
70.0	70.262	69.995	70.079	70.177	70.664	70.039	70.688	70.149	70.328

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one senso

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

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Malu.



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TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 22TM1491

Page : 1 of 3

Certificate of Calibration

Equipment :	Water Bath
Manufacturer :	Memmert
Model :	WNB22
Serial No. :	L513.0648
ID No. :	RYG_EN0061
Submitted by :	ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch) 616/10 Moo 5, T. Maenam Khu, A. Pluakdaeng, Rayong 21140, Thailand
Location :	Wet Chemistry Lab
Received Order :	20 October 2022
Calibration Date :	20 October 2022
Ambient Temperature :	(26 ± 10) °C
Relative Humidity :	(50 ± 30) %
Calibrated by :	Preecha Hlahib



Approved by :

Malee

Approved Signatory

- () Pornthippa Tameyakul
(☒) Malee Butkruea
() Suwit Imjai

Issue Date :

2 November 2022

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2210-0376OC-4

Cert. No.: 22TM1491

Page : 2 of 3

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT04 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Data Acquisition	34970A	MY44035217	21LM30	23 Dec 2022

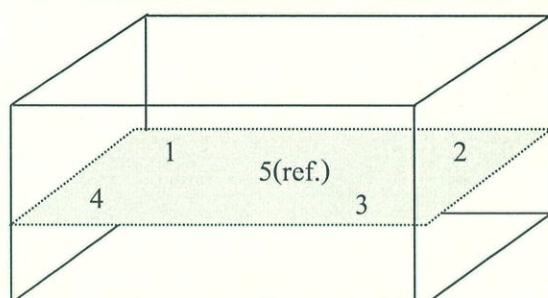
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	24	53	222
Finished of Calibration	24	50	221



Front

Position :	Ref. Std. S/N.:
1	N37P300726
2	N37P300727
3	N37P300728
4	N37P300729
5(ref.)	N37P300730

Malu



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2210-0376OC-4
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 22TM1491
Page : 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)				
			Position				
			1	2	3	4	5 (ref.)
85.0	85.0	85.0	84.527	84.563	84.628	84.516	84.580

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Uncertainty (± °C)	Coverage Factor <i>k</i>
85.0	0.12	0.081	0.18	2

Average* : The average of 30 values in each position.

Uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity.

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 %.

-o0o-

Malu.

Certificate of Calibration

Equipment:	Block Digestion Unit	Certificate No.:	C29230010
Model:	KT-20s	Issued Date:	18 March 2023
Serial No. (or ID.):	5720210009/5770200073	Job No.:	KSPR2304362
Manufacturer:	Gerhardt	Page:	1 of 4
Condition:	In Condition	Digestion Block:	20 holes.

Customer: ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
616/10 Moo 5 T.Maenam Khu, A.Pluakdaeng,
Rayong 21140, Thailand.

Environment Condition:

Temperature:	25 °C	±	0.5 °C
Humidity:	65 %RH	±	3.7 %RH
Voltage:	231 VAC	±	3.1 VAC

REVIEW BY N. Banuett
APPROVED BY D. Srichana
NEXT CAL. DATE 15/03/24

Calibration Place: ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
(Wet Chemistry Lab)
616/10 Moo 5 T.Maenam Khu, A.Pluakdaeng,
Rayong 21140, Thailand.

Calibration By: Mr. Nakarin Ruenros

Calibration Date: 15 March 2023

The Method used: In house method, base on by comparison with standard

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through N.M. Technical Center Laboratory (NTL)
Certificate No.: TC22/0080



(Mr. Nakarin Ruenros)

Person in charge



(Mr. Udon Srichana)

Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor ($k=2$) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

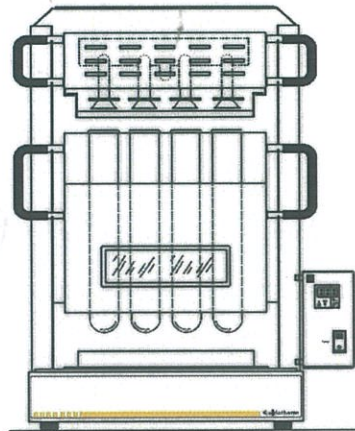
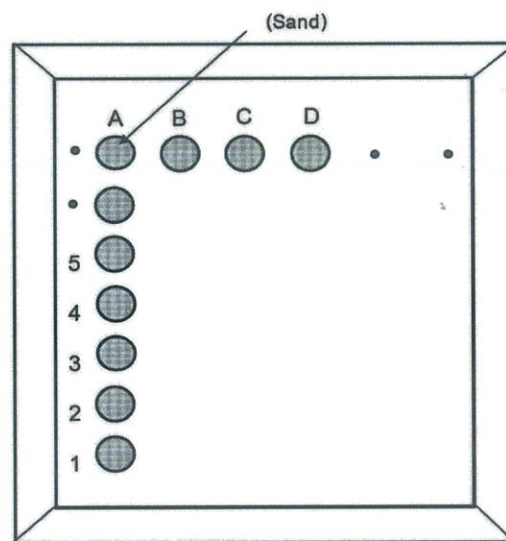


Fig. 1.: Front view



Location of standard

Fig. 2.: Digestion block

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the Digestion block.

Measured Temperature: The average reading of working standard at any positions or location.

Calibration Results:
Before adjustment

Locations	Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
A1	380	380	380	375.1	-4.9	1.5
A2				374.3	-5.7	1.5
A3				374.6	-5.4	1.5
A4				376.3	-3.7	1.5
A5				373.2	-6.8	1.5
B1				374.4	-5.6	1.5
B2				374.3	-5.7	1.5
B3				374.6	-5.4	1.5
B4				375.2	-4.8	1.5
B5				375.1	-4.9	1.5
C1				373.5	-6.5	1.5
C2				372.8	-7.2	1.5
C3				372.1	-7.9	1.5
C4				372.2	-7.8	1.5
C5				374.5	-5.5	1.5
D1				374.7	-5.3	1.5
D2				375.3	-4.7	1.5
D3				375.5	-4.5	1.5
D4				375.8	-4.2	1.5
D5				375.1	-4.9	1.5

Calibration Results:
After adjustment

Locations	Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
A1	380	380	380	379.0	-1.0	1.5
A2				378.7	-1.3	1.5
A3				379.4	-0.6	1.5
A4				379.2	-0.8	1.5
A5				379.2	-0.8	1.5
B1				379.8	-0.2	1.5
B2				379.2	-0.8	1.5
B3				379.5	-0.5	1.5
B4				378.9	-1.1	1.5
B5				379.1	-0.9	1.5
C1				379.1	-0.9	1.5
C2				377.7	-2.3	1.5
C3				378.4	-1.6	1.5
C4				378.2	-1.8	1.5
C5				378.0	-2.0	1.5
D1				379.5	-0.5	1.5
D2				378.7	-1.3	1.5
D3				379.7	-0.3	1.5
D4				379.5	-0.5	1.5
D5				379.4	-0.6	1.5

The End of Certificate

ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: KSPR2304362

ชนิดเครื่องมือ: Block Digestion Unit

รุ่น: KT-20s

หมายเลขเครื่อง: 5720210009/5770200073

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
15 Mar 2023			15 Mar 2023		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. สภาพ Hole	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. สภาพฝาปิด	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภาพตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ :

Mr. Nakarin Ruenros

Service Engineer

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: GM-6
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Phatthanakan 40, Phatthanakan Rd., Suan Luang, Bangkok 10250

Date: June 26, 2023 5:00:36 PM
EQP Name: AgilentRecommended , AgilentRecommended
EQP Revision: GC.02.53, GCMS.02.54
Overall Qualification Status: Pass

REVIEW BY	Nant Somb
APPROVED BY	LL AL
NEXT CAL. DATE	26/12/24

CDS Logon Verification - GC

Logon: Nanthawadee.Somboon

Overall CDS Logon Verification - GC Test 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 Accuracy

Name: 7890

Front SSL

Setpoint Status: Pass

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

Date: June 26, 2023 5:00:36 PM
System ID: GM-6

Overall Inlet Pressure Accuracy Test Status

Pass

Headspace Leak

Name: 7697A with Tray
Sampler 1

Setpoint Status: Pass

Overall Headspace Leak Test Status

Pass

Headspace Heated Zones Temperature Accuracy

Name: 7697A with Tray
Sampler 1

Setpoint Status: Pass

Zone: Transferline

Temperature:

Setpoint 115.0 °C

Actual 115.5

Accuracy: 0.5 °C

Agilent Recommended: ≥ -1.8 % setpoint (-2.1 °C) ≤ 5.2 % setpoint (6.0 °C)

Setpoint Status: Pass

Zone: Sample Loop

Temperature:

Setpoint 110.0 °C

Actual 110.4

Accuracy: 0.4 °C

Agilent Recommended: ≥ -4.0 ≤ 4.0

Date: June 26, 2023 5:00:36 PM

System ID: GM-6

Setpoint Status:

Pass

Zone:

Oven

Temperature:

Setpoint 100.0 °C

Actual 100.6

Accuracy:

0.6 °C

Agilent Recommended:

≥ -4.0

≤ 4.0

Overall Headspace Heated Zones Temperature Accuracy Test

Pass

GC Oven Temperature Accuracy

Name:

7890

Setpoint Status:

Pass

Zone:

Oven

Setpoint/Actual

Temperature:

230.0 231.1 °C

Accuracy:

1.1 °C

Agilent Recommended:

≥ -1.0

% setpoint in K

(-5.0 °C)

≤ 1.0

% setpoint in K

(5.0 °C)

Setpoint Status:

Pass

Zone:

Oven

Setpoint/Actual

Temperature:

100.0 100.2 °C

Accuracy:

0.2 °C

Agilent Recommended:

≥ -1.0

% setpoint in K

(-3.7 °C)

≤ 1.0

% setpoint in K

(3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name:

7890

Date:

June 26, 2023 5:00:36 PM

System ID:

GM-6

Setpoint Status:

Pass

Setpoint/Average

Temperature:

100.0 100.1667 °C

Stability:

0.1 °C

Agilent Recommended:

<= 0.5

Overall GC Oven Temperature Stability Test Status

Pass

Log Amp

Tested Combination1

Front

SSL

/ External

SQ

Name:

5975C inert XL with TAD

Setpoint Status:

Pass

Overall Log Amp Test Status

Pass

RFPA

Tested Combination1

Front

SSL

/ External

SQ

Name:

5975C inert XL with TAD

Setpoint Status:

Pass

Amu: 1050 m/z

Drift After Five Minutes:

RFPA Voltage:

22 mV

542 mV

Agilent Recommended:

>= -100 and <= 100

<= 1100

Overall RFPA Test Status

Pass

Tune EI

Tested Combination1

Front

SSL

/ External

SQ

Name:

5975C inert XL with TAD

Setpoint Status:

Pass

Filament:

1

Date: June 26, 2023 5:00:36 PM

System ID: GM-6

Setpoint Status: Pass

Filament:

2

Overall Tune EI Test Status

Pass

Scouting Run

Tested Combination1 Front SSL / External SQ

Headspace

Name: 7697A with Tray

Source: EI - Inert

Setpoint Status: Completed

Injection Volume on Column: 1000 uL

Overall Scouting Run Status

Completed

Injection Precision

Tested Combination1 Front SSL / External SQ

Name: 7697A with Tray

Source: EI - Inert

Setpoint Status: Pass

Injection Volume on Column: 1000 uL

Area RSD: 1.27 % Retention Time RSD: 0.00 %

Agilent Recommended: <= 5.00 <= 1.00

Overall Injection Precision Test Status

Pass

Mass Ratio Precision

Tested Combination1	Front	SSL	/ External	SQ
	Headspace			
Name:	7697A with Tray			
Source:	EI - Inert			
Setpoint Status:	Pass			
Injection Volume on Column:	1000	uL		
	Area Mass 1		Mass Ratio	
	Abundance*s			
RSD:	1.27	%	0.26	%
Agilent Recommended:	<= 5.00		<= 5.00	
	Pass		Pass	

Overall Mass Ratio Precision Test Status

Pass

Injection Carry Over

Tested Combination1	Front	SSL	/ External	SQ
Name:	7697A with Tray			
Source:	EI - Inert			
Setpoint Status:	Pass			
Injection Volume on Column:	1000	uL		
Area Carry Over:	0.00	%		
Agilent Recommended:	<= 1.00			

Overall Injection Carry Over Test Status

Pass

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	GM-6
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

Tested Combination1

Injection Technique	Headspace
Inlet	Front
Detector	External
LTM Included?	No

Sampler 1

Manufacturer	Agilent Technologies
Type	Headspace
Name	7697A with Tray
Model Number	G4557A
Serial Number	CN13020009
Firmware Revision	A.01.05.1
Sampling System	Loop fill
Location	Front
Injection Volume (µL)	1000
Headspace to GC Connection	EPC Headspace

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN12511186
Firmware Revision	A.01.14
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	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5975C inert XL with TAD
Model Number	G3172A
Serial Number	US13023A30
Firmware Revision	5.02.09
High Vacuum System	Turbo Pump
Scouting Run Standard	MRP Std

MS EI Source 1

Manufacturer	Agilent Technologies
Source Type	EI - Inert
Number of filaments	2

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:	June 26, 2023
Reason for Signature:	Executed protocol and published this original version of document

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User Name: sulkifli.mama
 Hostname: ASBKkW7004

System Id: GM-6
 Print Date: June 26, 2023 5:00:37 PM

6006258789_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 9:12:05 AM	Audit	SessionCreated	Session	None
June 26, 2023 9:12:05 AM	Start	Configuration	Session	None
June 26, 2023 9:12:05 AM	Audit	Entitlement	Licensing	User is FieldEngineer and does not require an unlock code
June 26, 2023 9:18:38 AM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.53/Gc.02.53.eqp], EQP File Name: [Gc.02.53.eqp], EQP Name: [AgilentRecommended], Protocol Revision :[Gc.02.53] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.54/GcMs.02.54.eqp], EQP File Name: [GcMs.02.54.eqp], EQP Name: [AgilentRecommended]
June 26, 2023 9:38:13 AM	End	Configuration	Session	None
June 26, 2023 9:38:21 AM	Start	Qualification	Session	OQ
June 26, 2023 9:38:21 AM	Start	Execution	CDS Logon Verification - GC - 7890: - Qualitative test	None
June 26, 2023 9:41:55 AM	End	Execution	CDS Logon Verification - GC - 7890: - Qualitative test	Run Count : 1
June 26, 2023 9:41:57 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None

User Name: sulkifli.mama
 Hostname: ASBKW7004

System Id: GM-6
 Print Date: June 26, 2023 5:00:37 PM

6006258789_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 9:42:21 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1
June 26, 2023 9:42:24 AM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
June 26, 2023 9:53:27 AM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
June 26, 2023 9:53:37 AM	Start	Execution	Headspace Leak - 7697A with Tray (Sampler 1): - Qualitative Test - No setpoints associated	None
June 26, 2023 10:18:48 AM	End	Execution	Headspace Leak - 7697A with Tray (Sampler 1): - Qualitative Test - No setpoints associated	Run Count : 1
June 26, 2023 10:18:52 AM	Start	Execution	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1): - Zone : Transferline - S: 115.0°C - L: >= -1.8% setpoint and <= 5.2% setpoint	None
June 26, 2023 10:20:42 AM	Audit	Data	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1): - Zone : Transferline - S: 115.0°C - L: >= -1.8% setpoint and <= 5.2% setpoint	Manual Data Entry
June 26, 2023 10:20:44 AM	End	Execution	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1): - Zone : Transferline - S: 115.0°C - L: >= -1.8% setpoint and <= 5.2% setpoint	Run Count : 1

User Name: sulkifli.mama
 Hostname: ASBKkW7004

System Id: GM-6
 Print Date: June 26, 2023 5:00:37 PM

6006258789_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 10:20:48 AM	Start	Execution	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1): - Zone : Sample Loop - S: 110.0°C - L: >= -4.0°C and <= 4.0°C	None
June 26, 2023 10:25:37 AM	Audit	Data	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1): - Zone : Sample Loop - S: 110.0°C - L: >= -4.0°C and <= 4.0°C	Manual Data Entry
June 26, 2023 10:25:39 AM	End	Execution	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1): - Zone : Sample Loop - S: 110.0°C - L: >= -4.0°C and <= 4.0°C	Run Count : 1
June 26, 2023 10:25:41 AM	Start	Execution	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1): - Zone : Oven - S: 100.0°C - L: >= -4.0°C and <= 4.0°C	None
June 26, 2023 10:32:03 AM	Audit	Data	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1): - Zone : Oven - S: 100.0°C - L: >= -4.0°C and <= 4.0°C	Manual Data Entry
June 26, 2023 10:32:05 AM	End	Execution	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1): - Zone : Oven - S: 100.0°C - L: >= -4.0°C and <= 4.0°C	Run Count : 1
June 26, 2023 10:32:08 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None

User Name: sulkifli.mama
 Hostname: ASBKkW7004

System Id: GM-6
 Print Date: June 26, 2023 5:00:37 PM

6006258789_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 10:37:21 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
June 26, 2023 10:37:27 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
June 26, 2023 10:37:29 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
June 26, 2023 10:42:29 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
June 26, 2023 10:42:31 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
June 26, 2023 10:42:37 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
June 26, 2023 10:44:35 AM	Start	Execution	Scouting Run - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	None
June 26, 2023 10:50:53 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
June 26, 2023 11:18:38 AM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry

User Name: sulkifli.mama
 Hostname: ASBKKW7004

System Id: GM-6
 Print Date: June 26, 2023 5:00:37 PM

6006258789_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 11:18:42 AM	End	Execution	GC Oven Temperature Stability	Run Count : 1 - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C
June 26, 2023 11:18:49 AM	Start	Execution	Scouting Run - 7697A with Tray	None Headspace, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation
June 26, 2023 11:21:31 AM	Start	Execution	Injection Precision - 7697A with Tray	None Headspace, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%
June 26, 2023 11:25:11 AM	Start	Execution	Scouting Run - 7697A with Tray	None Headspace, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation
June 26, 2023 12:53:12 PM	Start	Execution	Mass Ratio Precision - 7697A with Tray	None Headspace, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%
June 26, 2023 12:54:09 PM	Start	Execution	Scouting Run - 7697A with Tray	None Headspace, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation
June 26, 2023 12:54:32 PM	Start	Execution	Injection Precision - 7697A with Tray	None Headspace, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%
June 26, 2023 12:55:07 PM	Start	Execution	Mass Ratio Precision - 7697A with Tray	None Headspace, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%

User Name: suikifii.mama
 Hostname: ASBKkW7004

System Id: GM-6
 Print Date: June 26, 2023 5:00:37 PM

6006258789_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 12:55:19 PM	Start	Execution	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	None
June 26, 2023 1:00:19 PM	Start	Execution	Log Amp - 5975C inert XL with TAD SQ: - Source: EI - Inert	None
June 26, 2023 1:17:31 PM	End	Execution	Log Amp - 5975C inert XL with TAD SQ: - Source: EI - Inert	Run Count : 1
June 26, 2023 1:17:38 PM	Start	Execution	RFPA - 5975C inert XL with TAD SQ: - Source: EI - Inert	None
June 26, 2023 1:36:49 PM	End	Execution	RFPA - 5975C inert XL with TAD SQ: - Source: EI - Inert	Run Count : 1
June 26, 2023 1:36:52 PM	Start	Execution	Tune EI - 5975C inert XL with TAD SQ: - Source: - EI - Inert Filament 1 (Qualitative - No setpoints associated)	None
June 26, 2023 1:42:01 PM	End	Execution	Tune EI - 5975C inert XL with TAD SQ: - Source: - EI - Inert Filament 1 (Qualitative - No setpoints associated)	Run Count : 1
June 26, 2023 1:42:04 PM	Start	Execution	Tune EI - 5975C inert XL with TAD SQ: - Source: - EI - Inert Filament 2 (Qualitative - No setpoints associated)	None
June 26, 2023 1:46:45 PM	End	Execution	Tune EI - 5975C inert XL with TAD SQ: - Source: - EI - Inert Filament 2 (Qualitative - No setpoints associated)	Run Count : 1
June 26, 2023 1:46:47 PM	Start	Execution	Scouting Run - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	None

User Name: sulkifli.mama
 Hostname: ASBKkW7004

System Id: GM-6
 Print Date: June 26, 2023 5:00:37 PM

6006258789_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 2:01:24 PM	Start	Execution	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	None
June 26, 2023 4:20:32 PM	Start	Execution	Scouting Run - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	None
June 26, 2023 4:32:03 PM	Start	Execution	Scouting Run - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	None
June 26, 2023 4:33:04 PM	Audit	Data	Scouting Run - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	Data files Path : D:\OQ2023\HS\SC.D\DATA.MS
June 26, 2023 4:35:02 PM	End	Execution	Scouting Run - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert- Part of GCMS System Preparation	Run Count : 1
June 26, 2023 4:35:05 PM	Start	Execution	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	None
June 26, 2023 4:35:32 PM	Audit	Data	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\OQ2023\HS\IP02.D\DATA.MS

User Name: sulkifli.mama
 Hostname: ASBKKW7004

System Id: GM-6
 Print Date: June 26, 2023 5:00:37 PM

6006258789_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 4:35:32 PM	Audit	Data	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\OQ2023\HS\IP03.D\DATA .MS
June 26, 2023 4:35:32 PM	Audit	Data	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\OQ2023\HS\IP04.D\DATA .MS
June 26, 2023 4:35:32 PM	Audit	Data	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\OQ2023\HS\IP05.D\DATA .MS
June 26, 2023 4:35:33 PM	Audit	Data	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\OQ2023\HS\IP06.D\DATA .MS
June 26, 2023 4:35:33 PM	Audit	Data	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\OQ2023\HS\IP07.D\DATA .MS
June 26, 2023 4:36:00 PM	End	Execution	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: - EI - Inert L (Area): <= 5.00% - L (Ret. Time): <= 1.00%	Run Count : 1
June 26, 2023 4:36:04 PM	Start	Execution	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	None

User Name: sulkifli.mama
 Hostname: ASBKKW7004

System Id: GM-6
 Print Date: June 26, 2023 5:00:37 PM

6006258789_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 4:36:30 PM	Audit	Data	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\OQ2023\HS\IP02.D\DATA .MS
June 26, 2023 4:36:31 PM	Audit	Data	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\OQ2023\HS\IP03.D\DATA .MS
June 26, 2023 4:36:31 PM	Audit	Data	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\OQ2023\HS\IP04.D\DATA .MS
June 26, 2023 4:36:31 PM	Audit	Data	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\OQ2023\HS\IP05.D\DATA .MS
June 26, 2023 4:36:33 PM	Audit	Data	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\OQ2023\HS\IP06.D\DATA .MS
June 26, 2023 4:36:33 PM	Audit	Data	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Data files Path : D:\OQ2023\HS\IP07.D\DATA .MS
June 26, 2023 4:37:26 PM	End	Execution	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ: - Source: EI - Inert - L (RSD): <= 5.00%	Run Count : 1
June 26, 2023 4:37:32 PM	Start	Execution	Injection Carry Over - 7697A with Tray Headspace, Front SSL, SQ: - Headspace Sampler - EI - Inert - L: <= 1.00%	None

User Name: sulkifli.mama
Hostname: ASBKkW7004

System Id: GM-6
Print Date: June 26, 2023 5:00:37 PM

6006258789_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 4:37:53 PM	Audit	Data	Injection Carry Over - 7697A with Tray Headspace, Front SSL, SQ: - Headspace Sampler - EI - Inert - L: <= 1.00%	Data files Path : D:\OQ2023\HS\NP07.D\DATA .MS
June 26, 2023 4:37:53 PM	Audit	Data	Injection Carry Over - 7697A with Tray Headspace, Front SSL, SQ: - Headspace Sampler - EI - Inert - L: <= 1.00%	Data files Path : D:\OQ2023\HS\BL.D\DATA. MS
June 26, 2023 4:39:51 PM	End	Execution	Injection Carry Over - 7697A with Tray Headspace, Front SSL, SQ: - Headspace Sampler - EI - Inert - L: <= 1.00%	Run Count : 1
June 26, 2023 4:39:58 PM	End	Qualification	Session	OQ
June 26, 2023 4:39:58 PM	Start	Reporting	Session	None
June 26, 2023 4:59:30 PM	Audit	Reporting	Session	Report Generated : Certificate

REVIEW BY

Mont Somb

APPROVED BY

KL AL

NEXT CAL. DATE

21/12/23

Agilent CrossLab Compliance Services

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: GM-7
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Patthanakarn 40, Patthanakarn rd., Khwang Suan Luang, Khet Suan Luang, Bangkok 10250
Date: June 21, 2022 2:04:12 PM
EQP Name: AgilentRecommended , AgilentRecommended
EQP Revision: GC.02.50, GCMS.02.50
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 Accuracy

Name: 7890

Front SSL

Setpoint Status: Pass

	Setpoint	Actual
Inlet Pressure:	25.0 psi	25.0 psi
Accuracy:		0.0 psi
Agilent Recommended:	<=	1.2

Overall Inlet Pressure Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Date: June 21, 2022 2:04:12 PM
System ID: GM-7

Setpoint Status:

Pass

Zone:

Oven

Setpoint/Actual

Temperature:

230.0

230.0

°C

Accuracy:

0.0

°C

Agilent Recommended:

>=

-1.0

% setpoint in K

(

-5.0

°C

)

<=

1.0

% setpoint in K

(

5.0

°C

)

Setpoint Status:

Pass

Zone:

Oven

Setpoint/Actual

Temperature:

100.0

100.4

°C

Accuracy:

0.4

°C

Agilent Recommended:

>=

-1.0

% setpoint in K

(

-3.7

°C

)

<=

1.0

% setpoint in K

(

3.7

°C

)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name:

7890

Setpoint Status:

Pass

Setpoint/Average

Temperature:

100.0

100.0333

°C

Stability:

0.1

°C

Agilent Recommended:

<=

0.5

Overall GC Oven Temperature Stability Test Status

Pass

Log Amp

Tested Combination1

Front

SSL

/ External

SQ

Name:

5977A

Setpoint Status:

Pass

Date:

June 21, 2022 2:04:12 PM

System ID:

GM-7

Overall Log Amp Test Status

Pass

RFPA

Tested Combination1

Front

SSL

/ External

SQ

Name:

5977A

Setpoint Status:

Pass

Amu:

1050

m/z

Drift After Five Minutes:

22

mV

RFPA Voltage:

568

mV

Agilent Recommended:

>=

-100

and

<=

100

<=

1100

Overall RFPA Test Status

Pass

Tune EI

Tested Combination1

Front

SSL

/ External

SQ

Name:

5977A

Setpoint Status:

Pass

Filament:

1

Setpoint Status:

Pass

Filament:

2

Overall Tune EI Test Status

Pass

Signal to Noise EI

Tested Combination1

Front

SSL

/ External

SQ

Name:

5977A

Date:

June 21, 2022 2:04:12 PM

System ID:

GM-7

Source: Filament:

Setpoint Status:

Signal to Noise:

Agilent Recommended:

Source: Filament:

Setpoint Status:

Signal to Noise:

Agilent Recommended:

This test's 0 comment(s) and 1 deviation(s) are available in the Attachments section.

Overall Signal to Noise EI Test Status

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	GM-7
Manufacturer	Agilent Technologies
Name	7890

Tested Combination1

Injection Technique	Manual Injection
Inlet	Front
Detector	External
LTM Included?	No

Sampler 1

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

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3442B
Serial Number	CN14133181
Firmware Revision	B.02.03
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	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5977A
Serial Number	US1415M209
Firmware Revision	5977 6.00.21
High Vacuum System	Turbo Pump
Scouting Run Standard	OFN Std

MS EI Source 1

Manufacturer	Agilent Technologies
Source Type	EI - Extractor
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 logon 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:	Supasak Nimsongtham
Logged On User Name:	supasak.nimsongtham@agilent.com
Signature Creation Date:	June 21, 2022
Reason for Signature:	Executed protocol and published this original version of document

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Date:	June 21, 2022 2:04:12 PM
System ID:	GM-7

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-7
 Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 10:25:05 AM	Audit	SessionCreated	Session	None
June 21, 2022 10:25:05 AM	Start	Configuration	Session	None
June 21, 2022 10:25:05 AM	Audit	Entitlement	Licensing	User is FieldEngineer and does not require an unlock code
June 21, 2022 10:25:26 AM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.50/Gc.02.50.eqp], EQP File Name: [Gc.02.50.eqp], EQP Name: [AgilentRecommended] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.50/GcMs.02.50.eqp], EQP File Name: [GcMs.02.50.eqp], EQP Name: [AgilentRecommended]
June 21, 2022 10:25:39 AM	End	Configuration	Session	None
June 21, 2022 10:25:43 AM	Start	Qualification	Session	OQ
June 21, 2022 10:25:43 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
June 21, 2022 10:25:54 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-7
 Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 10:26:00 AM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
June 21, 2022 10:26:10 AM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
June 21, 2022 10:26:12 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
June 21, 2022 10:34:09 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
June 21, 2022 10:34:10 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
June 21, 2022 10:34:11 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
June 21, 2022 10:38:42 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
June 21, 2022 10:38:44 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
June 21, 2022 10:38:46 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None

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Date: June 21, 2022 2:04:12 PM
 System ID: GM-7

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-7
 Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 11:01:00 AM	Audit	AceClosed	Session	None
June 21, 2022 11:01:47 AM	Audit	AceRestarted	Session	None
June 21, 2022 11:01:48 AM	Audit	SessionReloaded	Session	None
June 21, 2022 11:01:51 AM	Start	Qualification	Session	OQ
June 21, 2022 11:01:51 AM	Start	Execution	GC Oven Temperature Stability	None
			- 7890: - Temperature : Oven -	
			S: 100.0°C - L: <= 0.5°C	
June 21, 2022 11:03:14 AM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over.
June 21, 2022 11:04:19 AM	Audit	Data	GC Oven Temperature Stability	Manual Data Entry
			- 7890: - Temperature : Oven -	
			S: 100.0°C - L: <= 0.5°C	
June 21, 2022 11:04:22 AM	End	Execution	GC Oven Temperature Stability	Run Count : 1
			- 7890: - Temperature : Oven -	
			S: 100.0°C - L: <= 0.5°C	
June 21, 2022 11:04:24 AM	Start	Execution	Log Amp - 5977A SQ: - Source:	None
			EI - Extractor	
June 21, 2022 11:04:34 AM	End	Execution	Log Amp - 5977A SQ: - Source:	Run Count : 1
			EI - Extractor	
June 21, 2022 11:04:37 AM	Start	Execution	RFPA - 5977A SQ: - Source:	EI None
			- Extractor	
June 21, 2022 11:07:49 AM	End	Execution	RFPA - 5977A SQ: - Source:	EI Run Count : 1
			- Extractor	
June 21, 2022 11:07:52 AM	Start	Execution	Tune EI - 5977A SQ: - Source: -	None
			EI - Extractor Filament 1	
			(Qualitative - No setpoints associated)	

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-7
 Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 11:08:35 AM	End	Execution	Tune EI - 5977A SQ: - Source: - Run Count : 1 EI - Extractor Filament 1 (Qualitative - No setpoints associated)	
June 21, 2022 11:14:59 AM	Start	Execution	Tune EI - 5977A SQ: - Source: - None EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
June 21, 2022 11:16:48 AM	End	Execution	Tune EI - 5977A SQ: - Source: - Run Count : 1 EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
June 21, 2022 11:16:49 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
June 21, 2022 11:17:05 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
June 21, 2022 11:17:10 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
June 21, 2022 11:26:09 AM	Audit	AceClosed	Session	None
June 21, 2022 12:36:20 PM	Audit	AceRestarted	Session	None
June 21, 2022 12:36:22 PM	Audit	SessionReloaded	Session	None
June 21, 2022 12:36:26 PM	Start	Qualification	Session	OQ
June 21, 2022 12:36:26 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-7
 Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 12:37:07 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
June 21, 2022 12:37:08 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
June 21, 2022 12:38:54 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : H:\ALSGM7_2022\SNF1_001.D
June 21, 2022 12:39:24 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : H:\ALSGM7_2022\SNF1_001.D
June 21, 2022 12:40:09 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : H:\ALSGM7_2022\SNF1_001.D
June 21, 2022 12:42:04 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : H:\ALSGM7_2022\SNF1_001.D
June 21, 2022 12:42:17 PM	Audit	AceClosed	Session	None
June 21, 2022 12:33:31 PM	Audit	AceRestarted	Session	None
June 21, 2022 12:33:33 PM	Audit	SessionReloaded	Session	None
June 21, 2022 12:33:37 PM	Start	Qualification	Session	OQ
June 21, 2022 12:33:37 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-7
 Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 12:34:44 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : E:\ALSGM7_2022\SNF1_001.D
June 21, 2022 12:36:26 PM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 1
June 21, 2022 12:37:11 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
June 21, 2022 12:38:15 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : E:\ALSGM7_2022\SNF2_001.D
June 21, 2022 12:38:30 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : E:\ALSGM7_2022\SNF2_001.D
June 21, 2022 12:38:45 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : E:\ALSGM7_2022\SNF2_001.D
June 21, 2022 12:39:00 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : E:\ALSGM7_2022\SNF2_001.D
June 21, 2022 12:39:14 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : E:\ALSGM7_2022\SNF2_001.D

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-7
 Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 12:39:45 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : E:\ALSGM7_2022\SNF2_001.D
June 21, 2022 12:40:16 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : E:\ALSGM7_2022\SNF2_001.D
June 21, 2022 12:40:40 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : E:\ALSGM7_2022\SNF2_001.D
June 21, 2022 12:41:09 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : E:\ALSGM7_2022\SNF2_001.D
June 21, 2022 12:41:29 PM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 1
June 21, 2022 12:42:30 PM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Deviation filed for Run Count : 1
June 21, 2022 12:42:30 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
June 21, 2022 12:42:35 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : E:\ALSGM7_2022\SNF2_001.D

User Name: supasak.nimsongtham
Hostname: 5CG1115HKC

System Id: GM-7
Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 12:42:45 PM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 2
June 21, 2022 12:42:50 PM	End	Qualification	Session	QQ
June 21, 2022 12:42:50 PM	Start	Reporting	Session	None
June 21, 2022 12:45:17 PM	Audit	AceClosed	Session	None
June 21, 2022 1:57:47 PM	Audit	AceRestarted	Session	None
June 21, 2022 1:57:50 PM	Audit	SessionReloaded	Session	None
June 21, 2022 1:57:56 PM	Start	Qualification	Session	QQ
June 21, 2022 2:02:42 PM	Audit	Reporting	Session	Report Generated : Certificate