

ภาคผนวก ค-5

ระดับเสียงในสถานประกอบการ



Analysis / Test Report

Client : Thai Polyethylene Co., Ltd.

10, Map Ta Phut Industrial Estate I-1 Road, Map Ta Phut, Muang District, Rayong Thailand 21150

P/O :

Project Name : Environmental Monitoring

Project Location : PP2

Lot ID: 21148973

Date Received : Feb 18, 2022

Date Reported : Feb 23, 2022

Report Number: 2240799-1

Page 1 of 1

Sample Number 21148973-1
Parameter Noise (Leq 8 hrs.)
Location หน่วยเพอร์เมอไรเซชัน
Measurement Date Feb 17, 2022
Measurement by Nantawat Sarin

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:29 AM - 10:29 AM	81.2	83.6	80.6
10:29 AM - 11:29 AM	80.5	82.2	80.1
11:29 AM - 12:29 PM	81.3	82.7	80.6
12:29 PM - 01:29 PM	81.5	83.1	81.0
01:29 PM - 02:29 PM	81.6	83.0	81.0
02:29 PM - 03:29 PM	81.8	83.9	81.1
03:29 PM - 04:29 PM	81.9	83.5	81.3
04:29 PM - 05:29 PM	82.0	83.3	81.4
Leq Average 8 hrs. (dB(A))	81.5		
Lmax (dB(A))		83.9	
Standard (dB(A))	90	140	
Reference Method : ISO1996-1 and 1996-2			
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๕๖			

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Thai Polyethylene Co., Ltd.

10, Map Ta Phut Industrial Estate I-1 Road, Map Ta Phut, Muang District, Rayong Thailand 21150

P/O :

Project Name : Environmental Monitoring

Project Location : PP2

Lot ID: 21148973

Date Received : Feb 18, 2022

Date Reported : Feb 23, 2022

Report Number: 2240800-1

Page 1 of 1

Sample Number 21148973-2
Parameter Noise (Leq 8 hrs.)
Location หน่วยตัดเม็ด
Measurement Date Feb 17, 2022
Measurement by Nantawat Sarin

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:36 AM - 10:36 AM	82.3	85.1	81.5
10:36 AM - 11:36 AM	83.0	85.5	82.3
11:36 AM - 12:36 PM	82.8	85.6	82.0
12:36 PM - 01:36 PM	82.8	85.9	82.0
01:36 PM - 02:36 PM	82.3	84.7	81.7
02:36 PM - 03:36 PM	82.0	84.8	81.2
03:36 PM - 04:36 PM	81.4	83.8	80.8
04:36 PM - 05:36 PM	81.6	83.9	81.1

Leq Average 8 hrs. (dB(A))

82.3

Lmax (dB(A))

85.9

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย

ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๔๖

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10, Map Ta Phut Industrial Estate I-1 Road, Map Ta Phut, Muang District, Rayong Thailand 21150

P/O :

Project Name : Environmental Monitoring

Project Location : PP2

Lot ID: 21148973

Date Received : Feb 18, 2022

Date Reported : Feb 23, 2022

Report Number: 2240801-1

Page 1 of 1

Sample Number 21148973-3
Parameter Noise (Leq 8 hrs.)
Location Compressor (ท่อขนส่ง Vent Gas และ Nitrogen)
Measurement Date Feb 17, 2022
Measurement by Nantawat Sarin

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
08:50 AM - 09:50 AM	78.1	82.0	77.7
09:50 AM - 10:50 AM	77.8	78.7	77.5
10:50 AM - 11:50 AM	77.8	78.8	77.4
11:50 AM - 12:50 PM	77.9	78.9	77.6
12:50 PM - 01:50 PM	78.3	80.0	77.9
01:50 PM - 02:50 PM	78.3	79.7	78.0
02:50 PM - 03:50 PM	78.1	79.2	77.8
03:50 PM - 04:50 PM	78.1	79.2	77.7

Leq Average 8 hrs. (dB(A))

78.1

Lmax (dB(A))

82.0

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย

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Analysis / Test Report

Client : Thai Polyethylene Co., Ltd.

10, Map Ta Phut Industrial Estate I-1 Road, Map Ta Phut, Muang District, Rayong Thailand 21150

P/O :

Project Name : Environmental Monitoring

Project Location : PP2

Lot ID: 2250283

Date Received : May 17, 2022

Date Reported : May 20, 2022

Report Number: 2318686-1

Page 1 of 1

Sample Number 2250283-1
Parameter Noise (Leq 8 hrs.)
Location หน่วยเพอร์มิเมอไรเซชัน
Measurement Date May 13, 2022
Measurement by Sittichai Kaewket

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:24 AM - 10:24 AM	83.9	86.0	83.3
10:24 AM - 11:24 AM	83.8	85.5	83.3
11:24 AM - 12:24 PM	83.9	85.8	83.3
12:24 PM - 01:24 PM	83.9	85.9	83.4
01:24 PM - 02:24 PM	83.8	85.9	83.3
02:24 PM - 03:24 PM	83.7	86.1	83.3
03:24 PM - 04:24 PM	83.8	85.7	83.3
04:24 PM - 05:24 PM	84.1	85.6	83.6
Leq Average 8 hrs. (dB(A))	83.9		
Lmax (dB(A))		86.1	
Standard (dB(A))	90	140	
Reference Method : ISO1996-1 and 1996-2			
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๔๖			

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Analysis / Test Report

Client : Thai Polyethylene Co., Ltd.

10, Map Ta Phut Industrial Estate I-1 Road, Map Ta Phut, Muang District, Rayong Thailand 21150

P/O :

Project Name : Environmental Monitoring

Project Location : PP2

Lot ID: 2250283

Date Received : May 17, 2022

Date Reported : May 20, 2022

Report Number: 2318687-1

Page 1 of 1

Sample Number 2250283-2
Parameter Noise (Leq 8 hrs.)
Location หน่วยตัดเม็ด
Measurement Date May 13, 2022
Measurement by Sittichai Kaewket

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	82.9	94.0	80.0
10:00 AM - 11:00 AM	80.7	85.3	79.9
11:00 AM - 12:00 PM	80.5	83.9	79.9
12:00 PM - 01:00 PM	80.7	84.4	79.9
01:00 PM - 02:00 PM	82.9	98.2	80.2
02:00 PM - 03:00 PM	84.8	100.3	80.7
03:00 PM - 04:00 PM	81.1	91.7	79.9
04:00 PM - 05:00 PM	80.9	84.1	80.1

Leq Average 8 hrs. (dB(A))

82.1

Lmax (dB(A))

100.3

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย

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Scientist (4)

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10, Map Ta Phut Industrial Estate I-1 Road, Map Ta Phut, Muang District, Rayong Thailand 21150

P/O :

Project Name : Environmental Monitoring

Project Location : PP2

Lot ID: 2250283

Date Received : May 17, 2022

Date Reported : May 20, 2022

Report Number: 2318688-1

Page 1 of 1

Sample Number 2250283-3
Parameter Noise (Leq 8 hrs.)
Location Compressor (ท่อขนส่ง Vent Gas และ Nitrogen)
Measurement Date May 13, 2022
Measurement by Sittichai Kaewket

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	76.9	80.1	76.3
10:00 AM - 11:00 AM	76.6	79.5	76.1
11:00 AM - 12:00 PM	76.6	78.5	76.1
12:00 PM - 01:00 PM	76.7	79.2	76.2
01:00 PM - 02:00 PM	76.6	81.4	76.0
02:00 PM - 03:00 PM	76.6	79.7	75.9
03:00 PM - 04:00 PM	76.5	82.7	76.0
04:00 PM - 05:00 PM	76.7	80.1	76.3

Leq Average 8 hrs. (dB(A))

76.7

Lmax (dB(A))

82.7

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย

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Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

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Supot Salamteh
Section Head

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ภาคผนวก ค-6

ระดับความร้อนในสถานประกอบการ



Analysis / Test Report

Client : Thai Polyethylene Co., Ltd.
10, Map Ta Phut Industrial Estate I-1 Road, Map Ta Phut, Muang District,
Rayong Thailand 21150

P/O :

Project Name : Environmental Monitoring

Project Location : PP2

Lot ID: 21148977

Date Received : Feb 18, 2022

Date Reported : Feb 22, 2022

Report Number: 2183803-1

Page 1 of 1

Sample Number 21148977-1
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date Feb 17, 2022
Measurement by Nantawat Sarin
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
หน่วยตัดไม้	120	29.3	28.0	32.4	32.1
Average (WBGT)		29.3			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Management

Supot Salamteh
Section Head

Approved by

Wichan Choonharat
Assistant Manager

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Analysis / Test Report

Client : Thai Polyethylene Co., Ltd.
10, Map Ta Phut Industrial Estate I-1 Road, Map Ta Phut, Muang District,
Rayong Thailand 21150

P/O :

Project Name : Environmental Monitoring

Project Location : PP2

Lot ID: 2250284

Date Received : May 17, 2022

Date Reported : May 20, 2022

Report Number: 2295693-1

Page 1 of 1

Sample Number 2250284-1
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date May 13, 2022
Measurement by Sittichai Kaewket
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณหน่วยตัดไม้	120	28.9	27.3	32.5	32.1
Average (WBGT)		28.9			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Management

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Assistant Manager

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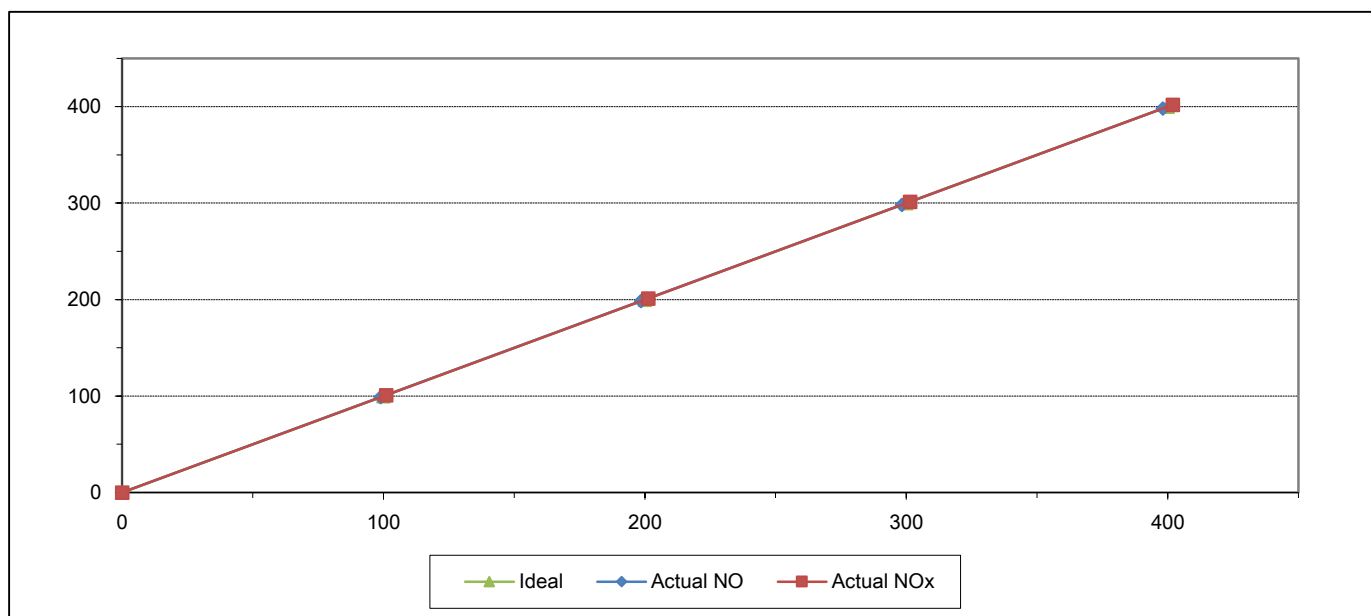
เอกสารการสอบเทียบเครื่องมือตรวจวิเคราะห์



MULTIPOINT CALIBRATION REPORT

Calibration Date	4-Jan-22	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	U8AOEAGK	Equipment ID	RYG_FS0551
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	51.33	Cylinder No.	LL36633
Cylinder Pressure (psi)	1200	Certified By	Airgas Inc.
Certified Date	18-Mar-14	Expired Date	18-Mar-22

Point	CALIBRATION RESULTS						
	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	99.00	-1.00	-1.00	101.00	1.00	1.00
2	200.00	198.50	-1.50	-0.75	201.30	1.30	0.65
3	300.00	298.40	-1.60	-0.53	301.50	1.50	0.50
4	400.00	398.20	-1.80	-0.45	402.00	2.00	0.50
AVERAGE (%)				-0.53			0.55



Calibrated By

(Mr.Jirawut Sakarn)
Field Environmental Scientist (3)

Approved By

(Mr.Sarayuth Jitranont)
Assistant General Manager

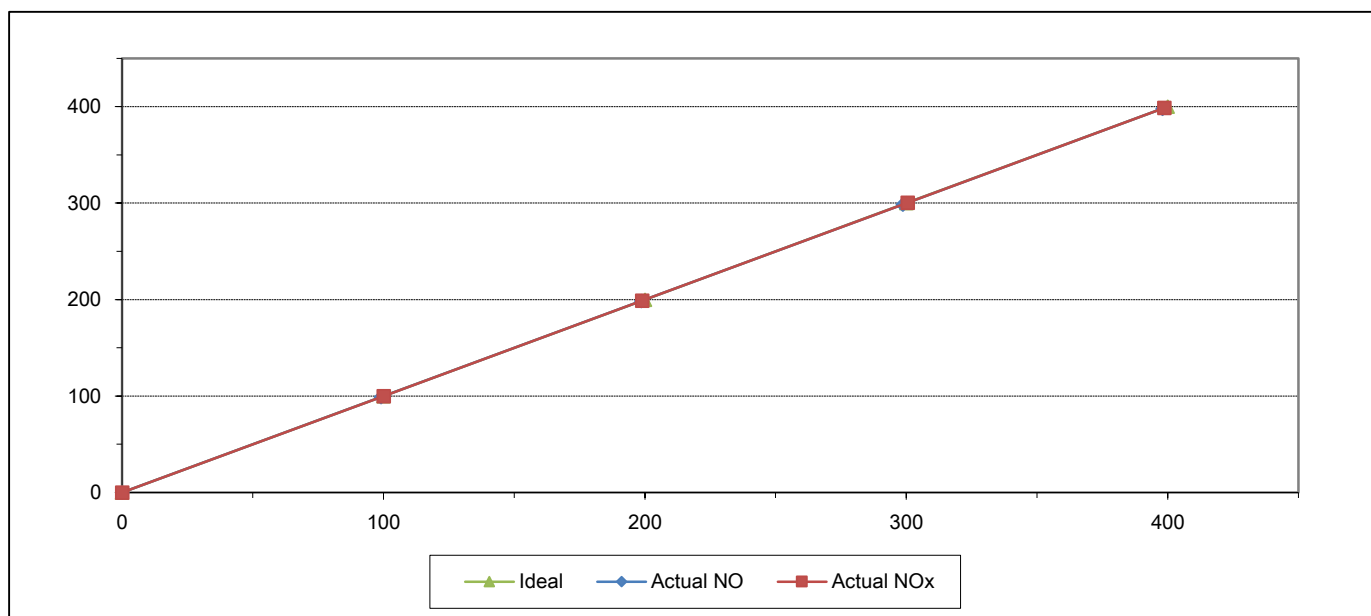


MULTIPOINT CALIBRATION REPORT

Calibration Date 4-Jan-22
Manufacturer HORIBA
Serial No. 7AV89544
Calibrator Manufacturer Teledyne API
Serial No. 947
Std. Gas Concentration (PPM) 51.33
Cylinder Pressure (psi) 1200
Certified Date 18-Mar-14

Equipment Name NOx Analyzer
Model APNA-370
Equipment ID RYG_FS0272
Model 700
Cylinder No. LL36633
Certified By Airgas Inc.
Expired Date 18-Mar-22

Point	CALIBRATION RESULTS						
	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.05	0.05	0.05	0.10	0.10	0.10
1	100.00	99.10	-0.90	-0.90	100.10	0.10	0.10
2	200.00	198.60	-1.40	-0.70	199.00	-1.00	-0.50
3	300.00	298.70	-1.30	-0.43	300.50	0.50	0.17
4	400.00	398.00	-2.00	-0.50	398.70	-1.30	-0.33
AVERAGE (%)				-0.50			-0.09



Calibrated By

(Mr.Jirawut Sakarn)
Field Environmental Scientist (3)

Approved By

(Mr.Sarayuth Jitranont)
Assistant General Manager

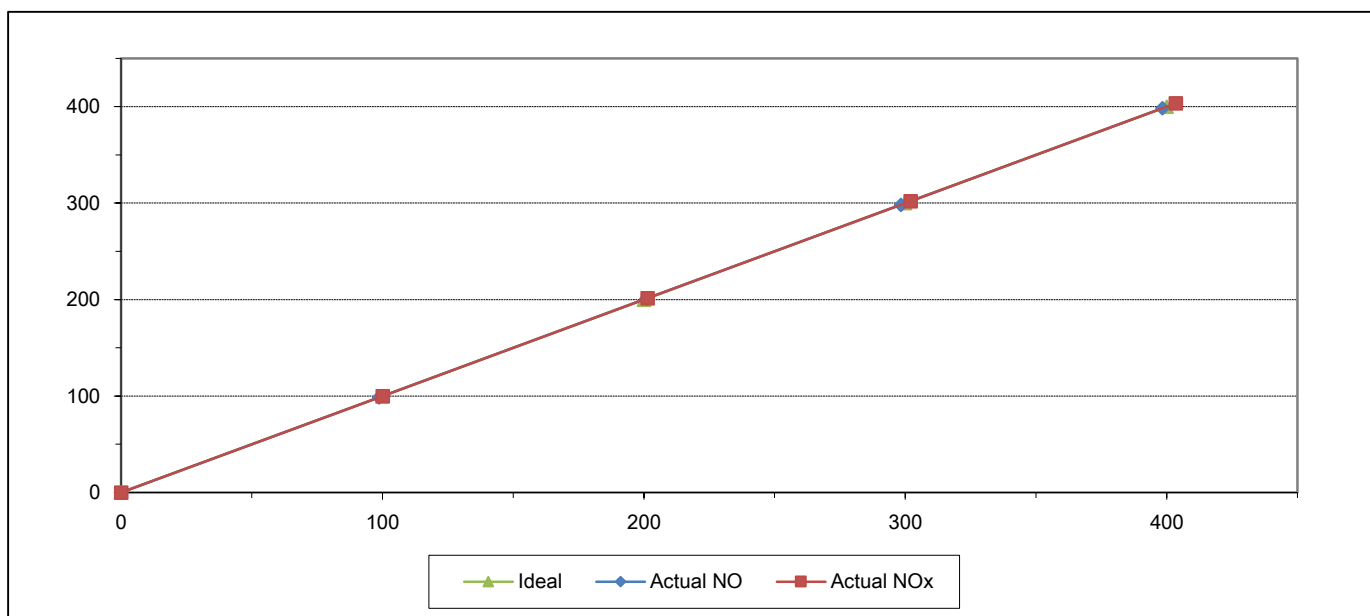


MULTIPOINT CALIBRATION REPORT

Calibration Date 4-Jan-22
Manufacturer HORIBA
Serial No. T95HWM41
Calibrator Manufacturer Teledyne API
Serial No. 947
Std. Gas Concentration (PPM) 51.33
Cylinder Pressure (psi) 1200
Certified Date 18-Mar-14

Equipment Name NOx Analyzer
Model APNA-370
Equipment ID RYG_FS0461
Model 700
Cylinder No. LL36633
Certified By Airgas Inc.
Expired Date 18-Mar-22

Point	CALIBRATION RESULTS						
	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	98.70	-1.30	-1.30	100.10	0.10	0.10
2	200.00	201.00	1.00	0.50	201.40	1.40	0.70
3	300.00	298.30	-1.70	-0.57	302.10	2.10	0.70
4	400.00	398.40	-1.60	-0.40	403.50	3.50	0.88
AVERAGE (%)				-0.33			0.50



Calibrated By

(Mr.Jirawut Sakarn)
Field Environmental Scientist (3)

Approved By

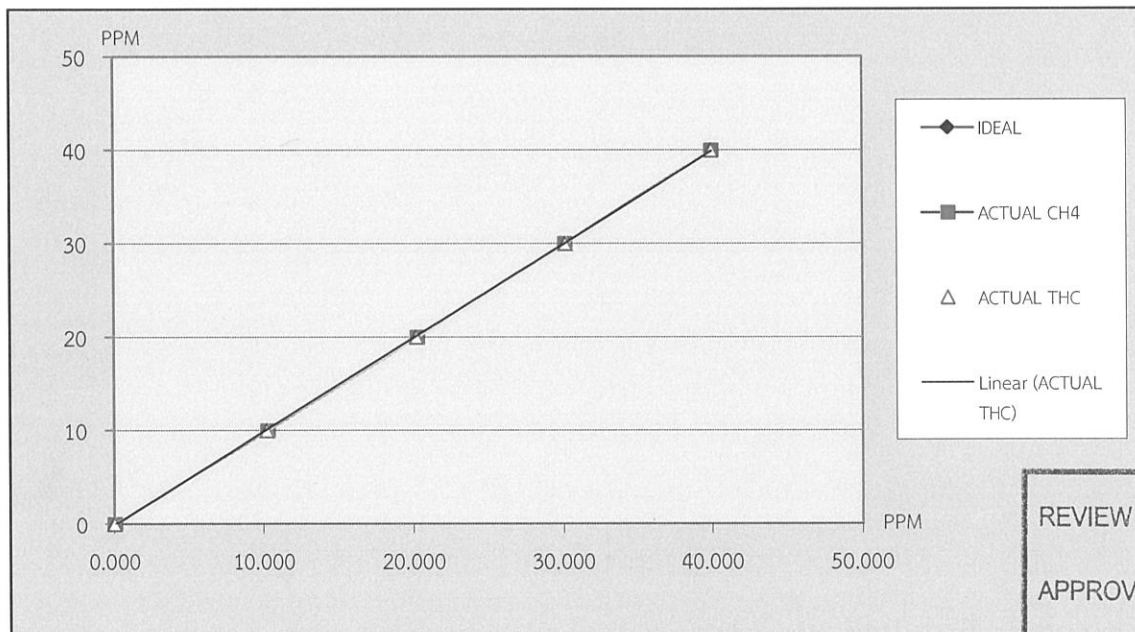
(Mr.Sarayuth Jitranont)
Assistant General Manager

TEST REPORT

CUSTOMER NAME	: ALS Laboratory Group (Thailand) Co., Ltd. [บริษัท เอแอลเอส แล็บอราทอรี กรุ๊ป (ประเทศไทย) จำกัด]						
EQUIPMENT NAME	: THC Analyzer						
MANUFACTURER	: HORIBA	MODEL	: APHA-370	SERIAL NO	: U430GTHB		
STANDARD GAS CONCENTRATION (PPM)	: 506.1 PPM			CYLINDER NO	: CC734373		
CYLINDER PRESSURE (psig)	: 1,600 PSI			CERTIFIED DATE	: 12/05/2020		
CERTIFIED BY	: AIRGAS			EXPIRED DATE	: 12/05/2028		

TEST RESULTS

POINT NO	TEST RESULTS						
	IDEAL	ACTUAL CH4	ERROR CH4	%ERROR CH4	ACTUAL THC	ERROR THC	%ERROR THC
ZERO	0.000	0.000	0.000	-	0.000	0.000	-
1	10.000	10.240	0.240	2.40	10.210	0.210	2.10
2	20.000	20.230	0.230	1.15	20.200	0.200	1.00
3	30.000	30.120	0.120	0.40	30.170	0.170	0.57
4	40.000	40.000	0.000	0.00	40.000	0.000	0.00
AVERAGE (%)				0.99			0.92



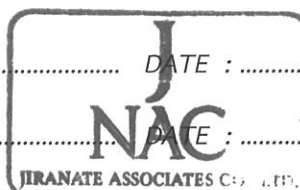
REVIEW BY Thanitall

APPROVED BY D. [Signature]

NEXT CAL. DATE 14/1/2023

CALIBRATED BY: วราพล ดักขิณเจริญ DATE: 14/1/65

CHECKED BY: ศุภกิจ อังนาคะ DATE: 14/1/65



ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-868-0812 # 15,16 , E-Mail : Engineer@jiranatee.com
เลขที่ 63/14-15,67/35-36 ถนนเพชรเกษม 7,7/1 แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-8680812-13 โทรสาร 02-868-1889

CHECK LIST

CUSTOMER NAME : ALS Laboratory Group (Thailand) Co., Ltd. [บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด]		
EQUIPMENT NAME : THC Analyzer		
MANUFACTURER : HORIBA	MODEL : APHA-370	SERIAL NO. : .U430GTHB

TEST VALUES				
NO.	THC Analyzer (APHA - 370)	UNIT	BEFORE	AFTER
1	Signal (CH4)	mV	29.500	51.300
2	Signal (THC)	mV	39.200	56.500
3	Detector	Temp °C , Standard Value : Ambient temp+(5°Cto15°C)	47.300	47.400
		Pressure kPa , Standard Value : (Ambient/1013x100-20)±4kPa	81.900	81.800
4	Ambient	kPa current atmospheric pressure	101.500	101.400
5	Purifire	°C , Standard Value : 390 °C to 430 °C	420.200	420.300
		kPa , Normal value : 8 kPa to 25 kPa	10.200	10.300
6	NMHC	°C , Standard Value : 230 °C to 260 °C	243.000	243.200
7	DC 24 V	V , Standard Value : 24 V ± 0.5 V	23.900	23.900
8	DC 5 V	V , Standard Value : 5 V ± 0.5 V	5.000	5.000
9	Bypass (Optional)	L/min, Normal value : 0.9 L/min ± 0.3 L/min	-	-
10	Over Flow (Optional)	L/min, Standard Value : 0.8 L/min or More	-	-
11	CH4 Sampling Reading	PPM	2.900	3.680
12	NMHC Sampling Reading	PPM	0.720	0.230
13	THC Sampling Reading	PPM	3.620	3.730
14	Zero Gas CH4/THC	PPM	0.27/0.32	0.00/0.00
15	Span Gas	PPM	37.80/37.85	40.0/40.0
G	Gas H2/.....	20 PSI	20	20

Remark : Reference EX-EN-017-56 , Ambient HC Monitor APHA-370 Operation Manual Page #81

Remark : (Ambient temperature = 5°C to 40°C)

อาการที่ตรวจพบ

- Service Maintenance

รายละเอียดการดำเนินการ

-

ผลการดำเนินการ

- เรียบร้อย เครื่องสามารถดำเนินการตรวจวัดได้ตามปกติ

CALIBRATED BY : ฐานพล ศุภกิจเจริญ
CHECKED BY : ศุภกิจ ฐานพล



DATE : 14/1/65
DATE : 14/1/65

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

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

CERTIFICATE OF CALIBRATION

Certificate No: WS-01102021

Page 1 of 2 pages

Measurement Item : Cup anemometer with data logger.

Manufacturer : Data logger: Novalynx.
: Cup anemometer: Novalynx.

Model/Type : Data logger: 200-WS-25DL
: Cup anemometer: WS-02F

Serial Number : Data logger: A4985
: Cup anemometer: -

ID No : Data logger: RYG_FS0085
: Cup anemometer: -

Customer : ALS laboratory group (Thailand) co., ltd.
: 104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.

Test Conditions	: Wind tunnel cross test section area	900	cm ²
	: Anemometer frontal area	100	cm ²
	: Diameter of mounting pipe	-	mm
	: Blockage ratio of test object	0.111	[-]

Test Conditions	: Air temperature	24.0	±0.8 °C
	: Air pressure	1008.1	±0.4 hPa
	: Relative air humidity	58.1	±3.5 %RH

Calibration Procedure : Calibration was carried out base on;
IEC 61400-12-1 ED.1: 2005-Power Performance Measurements of Electricity Producing Wind Turbines;
M&SNET Anemometer Calibration Procedure – Version 2: 2009;

Traceability : This calibration documents the traceable to national standard, Which realize the unit of measurements according to the international system of units (SI) through National Institute of Metrology Thailand (NIMT).

Measurement Date : Oct 08, 2021.

Issued Date : Oct 11, 2021.

Calibrated by

- ☒ Mr. Sorawit Thachalad
☐ Miss Orathai Wiwatwittaya



Approved Signatory:

25mmpd
Mr. Parinya Booncharoen
Technical Support
and Calibration Manager

Continuation of Certificate of Calibration Number

Certificate No: WS-01102021

Page 2 of 2 Pages

Result of calibration: ☒ Without adjustment ☐ With adjustment

Calibration in the range of 1 – 16 m/s at a calibration interval of 1 m/s.

The results of calibration and associated measurement uncertainties are reported in the table below.

V _{STD} Reading m/s	V _{UUC*} Reading m/s	Error (m/s)	Uncertainty (%)
2.049	1.9	-0.1	2.7
4.103	4.0	-0.1	1.3
6.01	6.0	0.0	1.1
8.01	8.0	0.0	0.99
9.99	10.0	0.0	1.0
11.99	12.1	0.1	0.64
13.98	14.1	0.1	0.55
16.02	16.2	0.2	0.40
15.03	15.2	0.2	0.78
12.99	13.1	0.1	0.61
11.00	11.0	0.0	1.1
9.00	9.0	0.0	0.75
7.02	7.0	0.0	0.84
5.147	5.0	-0.1	0.98
2.974	2.9	-0.1	1.7
1.013	0.9	-0.1	4.5

UUC*: Unit Under Calibration

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

Appendix 1: Instrumentations

NO	Sensor	Manufacturer	Model/Type	Calibration Date	Certificate Report Number	Range
1	Pitot static	TESTO INC.	06352145	Aug 07, 2021	MW-0034-21	5 – 30 m/s
2	Precision Differential Pressure Meter	Zoglab	DPM2500	Aug 07, 2021	MW-0034-21	5 – 30 m/s
3	Air velocity transducer (hot wire)	TSI INC.	8455-12	Aug 08, 2021	MW-0035-21	0 – 5 m/s
4	Temperature	Zoglab	DSR-THP	March 30, 2021	CL-027-64	-30 – 70°C
5	Relative humidity	Zoglab	DSR-THP	March 30, 2021	RH-03032021	0 – 100 %RH
6	Atmospheric pressure	Zoglab	DSR-THP	March 30, 2021	BP-01032021	500 – 1100 hPa
7	Wind tunnel	ESSOM	MP330D	-	-	0 – 50 Hz

End of certificate of calibration



CERTIFICATE OF CALIBRATION

Certificate No.: WD-01102021

Page 1 of 2 pages

Measurement Item : Wind direction sensor with data logger.

Manufacturer : Data logger: Novalynx.
: Wind direction sensor: Novalynx.

Model/Type : Data logger: 200-WS-25DL
: Wind direction sensor: WS-02F

Serial Number : Data logger: A4985
: Wind direction sensor: -

ID No : Data logger: RYG_FS0085
: Wind direction sensor: -

Customer : ALS laboratory group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10260
Thailand.

Environmental Condition:

The measurement was carried out in an ambient temperature of $(23 \pm 3) ^\circ\text{C}$, and relative humidity of $(40 \pm 10) \%$.

Measurement Method:

The wind direction sensor calibration according to comparison method with reference angle measurement electronic theodolite and line laser is used for axis control, The measurement were taken at 45° intervals in clockwise and counterclockwise directions.

Note: The UUC was warmed up for 1 hour prior to the calibration being performed

Traceability:

The measurement results are traceable to the international system of units (SI) through Certificate No.: CC563-07-0045, Certificate No.: KWS64/0025.

Measurement Date : Oct 08, 2021.

Issued Date : Oct 11, 2021.

Performed by

- ☒ Mr. Sorawit Thachalad
☐ Miss Orathai Wiwatwittaya



Approved Signatory:.....

Mr. Parinya Booncharoen.
Technical Support
and Calibration Manager

Continuation of Certificate of Calibration Number

Certificate No: WD-01102021

Pages 2 of 2 pages

Result of calibration: ☐ Without adjustment ☒ With adjustment.

Calibration in the range of 0 – 360 ° at a calibration interval of 45°.

The results of calibration and associated measurement uncertainties are reported in table below.

NO	Turning Direction	Nominal Angle (°)	Standard Reading (°)	UUC* Reading (°)	Error (°)	Uncertainty ±(°)
1	Clockwise	0/360	360	359	-1	3.0
2		45	45	42	-3	3.0
3		90	90	88	-2	3.0
4		135	135	135	0	3.0
5		180	180	182	2	3.0
6		225	225	228	3	3.0
7		270	270	273	3	3.0
8		315	315	318	3	3.0
9	Counter Clockwise	0/360	360	359	-1	3.0
10		45	45	42	-3	3.0
11		90	90	88	-2	3.0
12		135	135	135	0	3.0
13		180	180	182	2	3.0
14		225	225	228	3	3.0
15		270	270	273	3	3.0
16		315	315	318	3	3.0

UUC*: Unit Under Calibration The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No: WS-04072021

Page 1 of 2 pages

Measurement Item : Cup anemometer with data logger.

Manufacturer : Data logger: Novalynx.
: Cup anemometer: Novalynx.

Model/Type : Data logger: 200-WS-25DL.
: Cup anemometer: WS-02F.

Serial Number : Data logger: A4987.
: Cup anemometer: -.

ID No : Data logger: RYG_FS0089.
: Cup anemometer: -.

Customer : ALS laboratory group (Thailand) co., ltd.
: 104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250
Thailand.

Test Conditions : Wind tunnel cross test section area 900 cm²
: Anemometer frontal area 100 cm²
: Diameter of mounting pipe - mm
: Blockage ratio of test object 0.111 [-]

Test Conditions : Air temperature 24.0 ±0.8 °C
: Air pressure 1005.9 ±0.4 hPa
: Relative air humidity 63.3 ±3.5 %RH

Calibration Procedure Calibration was carried out base on;
IEC 61400-12-1 ED.1: 2005-Power Performance Measurements of Electricity Producing Wind
Turbines;
MEASNET Anemometer Calibration Procedure - Version 2: 2009;

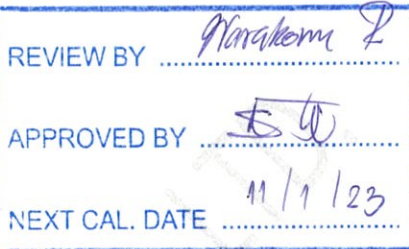
Traceability This calibration documents the traceable to national standard, Which realize the unit of
measurements according to the international system of units (SI) through National Institute of
Metrology Thailand (NIMT).

Measurement Date : Jul 13, 2021.

Issued Date : Jul 14, 2021.

Calibrated by

- ☒ Mr. Sorawit Thachalad
☐ Miss Orathai Wiwatwittaya



Approved Signatory:

Parinya Booncharoen

Mr. Parinya Booncharoen
Technical Support
and Calibration Manager

Continuation of Certificate of Calibration Number

Certificate No: WS-04072021

Page 2 of 2 Pages

Result of calibration: ☒ Without adjustment ☐ With adjustment

Calibration in the range of 1 – 16 m/s at a calibration interval of 1 m/s.

The results of calibration and associated measurement uncertainties are reported in the table below.

V _{STD} Reading m/s	V _{UUC} * Reading m/s	Error (m/s)	Uncertainty (%)
2.084	1.8	-0.3	2.7
4.112	4.0	-0.1	1.4
6.00	6.0	0.0	1.2
8.02	8.1	0.1	0.70
10.02	10.1	0.1	0.63
11.98	12.3	0.3	0.57
13.98	14.2	0.2	0.49
16.02	16.5	0.5	0.53
15.03	15.4	0.4	0.80
12.99	13.3	0.3	0.63
11.02	11.1	0.1	0.66
9.02	9.1	0.1	0.63
7.02	7.1	0.1	0.77
5.177	5.0	-0.2	0.97
3.007	3.0	0.0	1.7
1.053	0.6	-0.5	5.4

UUC*: Unit Under Calibration

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

Appendix 1: Instrumentations

NO	Sensor	Manufacturer	Model/Type	Calibration Date	Certificate Report Number	Range
1	Pitot static	T&STO INC.	06352145	July 16, 2020	MW-0035-20	5 – 30 m/s
2	Precision Differential Pressure Meter	Zoglab	DPM2500	July 16, 2020	MW-0035-20	5 – 30 m/s
3	Air velocity transducer (hot wire)	TSI INC.	8455-12	July 20, 2020	MW-0036AA-20	0 – 5 m/s
4	Temperature	Zoglab	DSR-THP	March 30, 2021	CL-027-64	-30 – 70°C
5	Relative humidity	Zoglab	DSR-THP	March 30, 2021	RH-03032021	0 – 100 %RH
6	Atmospheric pressure	Zoglab	DSR-THP	March 30, 2021	BP-01032021	500 – 1100 hPa
7	Wind tunnel	ESSOM	MP330D	-	-	0 – 50 Hz

End of certificate of calibration



CERTIFICATE OF CALIBRATION

Certificate No.: WD-04072021

Page 1 of 2 pages

Measurement Item : Wind direction sensor with data logger.

Manufacturer : Data logger: Novalynx.
: Wind direction sensor: Novalynx.

Model/Type : Data logger: 200-WS-25DL.
: Wind direction sensor: WS-02F.

Serial Number : Data logger: A4987.
: Wind direction sensor: -.

ID No : Data logger: RYG_FS0089.
: Wind direction sensor: -.

Customer : ALS laboratory group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250
Thailand.

Environmental Condition:

The measurement was carried out in an ambient temperature of $(23\pm3)^{\circ}\text{C}$, and relative humidity of $(40\pm10)\%$.

Measurement Method:

The wind direction sensor calibration according to comparison method with reference angle measurement electronic theodolite and line laser is used for axis control, The measurement were taken at 45° intervals in clockwise and counterclockwise directions.

Note: The UUC was warmed up for 1 hour prior to the calibration being performed

Traceability:

The measurement results are traceable to the international system of units (SI) through Certificate No.: CC563-07-0045,
Certificate No.: KWS63/0044.

Measurement Date : Jul 14, 2021.

Issued Date : Jul 14, 2021.



Performed by

- ☒ Mr. Sorawit Thachalad
☐ Miss Orathai Wiwatwittaya

Approved Signatory:.....

Mr. Parinya Booncharoen.
Technical Support
and Calibration Manager

Continuation of Certificate of Calibration Number

Certificate No: WD-04072021

Pages 2 of 2 pages

Result of calibration: ☐ Without adjustment ☒ With adjustment.

Calibration in the range of 0 – 360 ° at a calibration interval of 45°.

The results of calibration and associated measurement uncertainties are reported in table below.

NO	Turning Direction	Nominal Angle (°)	Standard Reading (°)	UUC* Reading (°)	Error (°)	Uncertainty ±(°)
1	Clockwise	0/360	0	0	0	3.0
2		45	45	42	-3	3.0
3		90	90	88	-2	3.0
4		135	135	133	-2	3.0
5		180	180	181	1	3.0
6		225	225	228	3	3.0
7		270	270	273	3	3.0
8		315	315	318	3	3.0
9	Counter Clockwise	0/360	0	0	0	3.0
10		45	45	42	-3	3.0
11		90	90	88	-2	3.0
12		135	135	133	-2	3.0
13		180	180	181	1	3.0
14		225	225	228	3	3.0
15		270	270	273	3	3.0
16		315	315	318	3	3.0

UUC*: Unit Under Calibration The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor $k=2$ providing a level of confidence of approximately 95%

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No: WS-14072021

Page 1 of 2 pages

Measurement Item : Cup anemometer with data logger.

Manufacturer : Data logger: Novalynx.
: Cup anemometer: Novalynx.

Model/Type : Data logger: 200-WS-25LB.
: Cup anemometer: WS-02F.

Serial Number : Data logger: A5376.
: Cup anemometer: -.

ID No : Data logger: RYG_FS0414.
: Cup anemometer: -.

Customer : ALS laboratory group (Thailand) co., ltd.
: 104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.

Test Conditions : Wind tunnel cross test section area 900 cm²
: Anemometer frontal area 100 cm²
: Diameter of mounting pipe - mm
: Blockage ratio of test object 0.111 [-]

Test Conditions : Air temperature 25.2 ±0.8 °C
: Air pressure 1006.6 ±0.4 hPa
: Relative air humidity 51.4 ±3.5 %RH

Calibration Procedure Calibration was carried out base on;
IEC 61400-12-1 ED.1: 2005-Power Performance Measurements of Electricity Producing Wind Turbines;
MGASNET Anemometer Calibration Procedure - Version 2: 2009;

Traceability This calibration documents the traceable to national standard, Which realize the unit of measurements according to the international system of units (SI) through National Institute of Metrology Thailand (NIMT).

Measurement Date : Jul 29, 2021.
Issued Date : Jul 29, 2021.

REVIEW BY *Wanlom P.*

APPROVED BY *[Signature]*

NEXT CAL. DATE *27/1/23*

Calibrated by

- ☒ Mr. Sorawit Thachalad
☐ Miss Orathai Wiwatwittaya



Approved Signatory: *[Signature]*

Mr. Parinya Booncharoen
Technical Support
and Calibration Manager

Continuation of Certificate of Calibration Number

Certificate No: WS-14072021

Page 2 of 2 Pages

Result of calibration: ☒ Without adjustment ☐ With adjustment

Calibration in the range of 1 – 16 m/s at a calibration interval of 1 m/s.

The results of calibration and associated measurement uncertainties are reported in the table below.

V _{STD} Reading m/s	V _{UUC} * Reading m/s	Error (m/s)	Uncertainty (%)
2.057	1.8	-0.3	3.1
4.135	4.0	-0.1	1.3
6.02	6.0	0.0	2.1
7.99	8.0	0.0	0.74
10.00	10.1	0.1	0.69
11.99	12.0	0.0	0.72
13.98	14.2	0.2	0.48
15.98	16.2	0.2	0.77
14.99	15.2	0.2	0.49
13.00	13.1	0.1	0.52
11.01	11.0	0.0	0.94
9.01	9.0	0.0	0.81
6.99	7.0	0.0	2.0
5.189	5.1	-0.1	0.96
2.987	3.0	0.0	2.0
1.034	0.8	-0.2	5.3

UUC*: Unit Under Calibration

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

Appendix 1: Instrumentations

NO	Sensor	Manufacturer	Model/Type	Calibration Date	Certificate Report Number	Range
1	Pitot static	TESTO INC.	06352145	July 16, 2020	MW-0035-20	5 – 30 m/s
2	Precision Differential Pressure Meter	Zoglab	DPM2500	July 16, 2020	MW-0035-20	5 – 30 m/s
3	Air velocity transducer (hot wire)	TSI INC.	8455-12	July 20, 2020	MW-0036AA-20	0 – 5 m/s
4	Temperature	Zoglab	DSR-THP	March 30, 2021	CL-027-64	-30 – 70°C
5	Relative humidity	Zoglab	DSR-THP	March 30, 2021	RH-03032021	0 – 100 %RH
6	Atmospheric pressure	Zoglab	DSR-THP	March 30, 2021	BP-01032021	500 – 1100 hPa
7	Wind tunnel	ESSOM	MP330D	-	-	0 – 50 Hz

End of certificate of calibration



CERTIFICATE OF CALIBRATION

Certificate No.: WD-14072021

Page 1 of 2 pages

Measurement Item : Wind direction sensor with data logger.

Manufacturer : Data logger: Novalynx.
: Wind direction sensor: Novalynx.

Model/Type : Data logger: 200-WS-25LB.
: Wind direction sensor: WS-02P.

Serial Number : Data logger: A5376.
: Wind direction sensor: -.

ID No : Data logger: RYG_FS0414.
: Wind direction sensor: -.

Customer : ALS laboratory group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250
Thailand.

Environmental Condition:

The measurement was carried out in an ambient temperature of $(23 \pm 3)^{\circ}\text{C}$, and relative humidity of $(40 \pm 10)\%$.

Measurement Method:

The wind direction sensor calibration according to comparison method with reference angle measurement electronic theodolite and line laser is used for axis control, The measurement were taken at 45° intervals in clockwise and counterclockwise directions.

Note: The UUC was warmed up for 1 hour prior to the calibration being performed

Traceability:

The measurement results are traceable to the international system of units (SI) through Certificate No.: CC563-07-0045, Certificate No.: KWS63/0044.

Measurement Date : Jul 29, 2021.

Issued Date : Jul 29, 2021.

Performed by

- ☒ Mr. Sorawit Thachalad
☐ Miss Orathai Wiwatwittaya



Approved Signatory:.....



Mr. Parinya Booncharoen.
Technical Support
and Calibration Manager

Continuation of Certificate of Calibration Number

Certificate No: WD-14072021

Pages 2 of 2 pages

Result of calibration: ☐ Without adjustment ☒ With adjustment.

Calibration in the range of 0 – 360 ° at a calibration interval of 45°.

The results of calibration and associated measurement uncertainties are reported in table below.

NO	Turning Direction	Nominal Angle (°)	Standard Reading (°)	UUC* Reading (°)	Error (°)	Uncertainty ±(°)
1	Clockwise	0/360	360	359	-1	3.0
2		45	45	43	-2	3.0
3		90	90	87	-3	3.0
4		135	135	132	-3	3.0
5		180	180	179	-1	3.0
6		225	225	228	3	3.0
7		270	270	273	3	3.0
8		315	315	318	3	3.0
9	Counter Clockwise	0/360	360	359	-1	3.0
10		45	45	43	-2	3.0
11		90	90	87	-3	3.0
12		135	135	132	-3	3.0
13		180	180	179	-1	3.0
14		225	225	228	3	3.0
15		270	270	273	3	3.0
16		315	315	318	3	3.0

UUC*: Unit Under Calibration The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%

End of Certificate of Calibration





ROTA METER CALIBRATION RESULT JANUARY 2022

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS0577	05 Jan 22	$Y = 0.9899x + 0.9112$	0.9999
BKK_FS0579	05 Jan 22	$Y = 1.007x - 0.0299$	1.0000
BKK_FS0583	05 Jan 22	$Y = 1.0513x + 1.869$	0.9967
BKK_FS0584	05 Jan 22	$Y = 1.0048x - 1.069$	1.0000
BKK_FS0585	05 Jan 22	$Y = 1.0076x - 1.1036$	0.9999
BKK_FS0586	05 Jan 22	$Y = 0.9933x + 3.2655$	1.0000
BKK_FS0587	05 Jan 22	$Y = 1.0401x - 17.457$	0.9996
BKK_FS0588	05 Jan 22	$Y = 1.0154x + 4.8357$	0.9999
BKK_FS0589	05 Jan 22	$Y = 0.9918x + 4.8069$	0.9999
BKK_FS0590	05 Jan 22	$Y = 0.9861x + 10.07$	0.9995
BKK_FS0591	05 Jan 22	$Y = 1.0117x - 92.415$	0.9995
BKK_FS0592	05 Jan 22	$Y = 1.0031x - 69.305$	0.9996
BKK_FS0593	05 Jan 22	$Y = 1.0131x - 98.198$	0.9996
BKK_FS0594	05 Jan 22	$Y = 1.0075x - 7.0829$	0.9999
BKK_FS0595	05 Jan 22	$Y = 1.0249x - 98.162$	0.9999
BKK_FS0596	05 Jan 22	$Y = 0.9843x - 26.806$	0.9991
BKK_FS0597	05 Jan 22	$Y = 1.0203x - 122.14$	0.9999
BKK_FS1004	04 Jan 22	$Y = 0.9651x + 19.648$	0.9989
BKK_FS1005	04 Jan 22	$Y = 1.0096x + 4.6643$	0.9997
BKK_FS1006	04 Jan 22	$Y = 1.2188x - 7.1214$	0.9994
BKK_FS1007	05 Jan 22	$Y = 1.0563x - 1.0912$	1.0000
BKK_FS1008	05 Jan 22	$Y = 0.9689x + 1.9061$	1.0000
BKK_FS1009	05 Jan 22	$Y = 1.0132x + 1.1633$	0.9960
BKK_FS1010	05 Jan 22	$Y = 1.0033x + 0.5758$	0.9999
BKK_FS1014	05 Jan 22	$Y = 1.0021x + 0.3148$	0.9998
BKK_FS1015	05 Jan 22	$Y = 0.9994x + 1.786$	1.0000
BKK_FS1016	05 Jan 22	$Y = 1.0105x - 80.256$	0.9998
BKK_FS1017	05 Jan 22	$Y = 0.9995x + 0.649$	1.0000
BKK_FS1018	05 Jan 22	$Y = 1.0011x + 1.1786$	1.0000
BKK_FS1019	05 Jan 22	$Y = 1.0023x - 68.424$	0.9996
BKK_FS1020	05 Jan 22	$Y = 0.9887x + 2.8844$	0.9999
BKK_FS1021	05 Jan 22	$Y = 0.9659x + 1.4905$	0.9978
BKK_FS1022	05 Jan 22	$Y = 1.022x - 17.957$	0.9997
BKK_FS1023	05 Jan 22	$Y = 1.0094x + 0.0717$	0.9999
BKK_FS1024	05 Jan 22	$Y = 1.0042x + 0.4086$	0.9997
BKK_FS1025	05 Jan 22	$Y = 1.0132x - 88.507$	0.9996
BKK_FS1026	05 Jan 22	$Y = 0.9902x + 0.9554$	1.0000
BKK_FS1027	05 Jan 22	$Y = 1.0086x - 2.279$	1.0000
BKK_FS1028	05 Jan 22	$Y = 1.0105x - 81.055$	0.9997



ROTA METER CALIBRATION RESULT JANUARY 2022

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS1029	05 Jan 22	$Y = 0.9935x + 0.8234$	1.0000
BKK_FS1030	05 Jan 22	$Y = 1.0039x + 0.515$	0.9999
BKK_FS1031	05 Jan 22	$Y = 1.009x - 79.295$	0.9998
BKK_FS1039	04 Jan 22	$Y = 0.9916x + 6.1524$	0.9988
BKK_FS1040	04 Jan 22	$Y = 1.0133x - 10.177$	0.9985
BKK_FS1041	04 Jan 22	$Y = 1.0805x - 1.7381$	0.9998
BKK_FS1042	04 Jan 22	$Y = 1.0061x + 1.3405$	0.9994
BKK_FS1043	04 Jan 22	$Y = 1.0112x - 10.393$	0.9999
BKK_FS1044	04 Jan 22	$Y = 1.0495x - 1.0136$	0.9996
BKK_FS1161	05 Jan 22	$Y = 0.9812x + 15571$	1.0000
BKK_FS1162	05 Jan 22	$Y = 0.9932x + 5.0014$	0.9997
BKK_FS1163	05 Jan 22	$Y = 1.0082x - 82.062$	0.9998
BKK_FS1164	05 Jan 22	$Y = 0.9914x + 0.8427$	0.9997
BKK_FS1165	05 Jan 22	$Y = 0.9893x + 6.5919$	0.9998
BKK_FS1166	05 Jan 22	$Y = 1.0031x - 77.881$	0.9996
RYG_FS0197	04 Jan 22	$Y = 1.0068x + 1.7152$	0.9998
RYG_FS0198	04 Jan 22	$Y = 0.9986x + 18.196$	0.9995
RYG_FS0199	04 Jan 22	$Y = 1.1202x - 3.5782$	0.9999

Review By :

(Mr. Wichan Choonharat)

Enviro Field Services Manager

Approved By :

(Mr. Sarayuth Jittrantont)

Assistant General Manager



ROTA METER CALIBRATION RESULT APRIL 2022

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS0577	01 Apr 22	$Y = 1.0202x + 0.1976$	1.0000
BKK_FS0579	01 Apr 22	$Y = 1.0078x + 0.4789$	0.9998
BKK_FS0583	01 Apr 22	$Y = 1.016x + 0.3922$	1.0000
BKK_FS0584	01 Apr 22	$Y = 1.0036x + 2.2262$	0.9997
BKK_FS0585	01 Apr 22	$Y = 1.0189x - 5.6476$	0.9997
BKK_FS0586	01 Apr 22	$Y = 1.0095x - 1.1524$	0.9995
BKK_FS0587	01 Apr 22	$Y = 1.013x - 3.6619$	0.9996
BKK_FS0588	01 Apr 22	$Y = 1.0154x + 4.8357$	0.9999
BKK_FS0589	01 Apr 22	$Y = 0.9918x + 4.8069$	0.9999
BKK_FS0590	01 Apr 22	$Y = 1.0038x - 0.4857$	0.9996
BKK_FS0591	01 Apr 22	$Y = 0.9705x - 52.174$	0.9986
BKK_FS0592	01 Apr 22	$Y = 0.9646x - 37.642$	0.9985
BKK_FS0593	01 Apr 22	$Y = 0.9767x - 58.445$	0.9988
BKK_FS0594	01 Apr 22	$Y = 0.9902x - 62.87$	0.9999
BKK_FS0595	01 Apr 22	$Y = 1.0249x - 98.162$	0.9999
BKK_FS0596	01 Apr 22	$Y = 0.9843x - 26.806$	0.9991
BKK_FS0597	01 Apr 22	$Y = 0.9802x - 61.653$	0.9978
BKK_FS1004	01 Apr 22	$Y = 0.9696x + 17.69$	0.9990
BKK_FS1005	01 Apr 22	$Y = 1.0065x + 5.6786$	0.9997
BKK_FS1006	01 Apr 22	$Y = 1.2142x - 7.1037$	0.9993
BKK_FS1007	01 Apr 22	$Y = 0.9917x + 1.6592$	1.0000
BKK_FS1008	01 Apr 22	$Y = 1.0132x + 0.7207$	1.0000
BKK_FS1009	01 Apr 22	$Y = 1.0132x + 1.1633$	0.9960
BKK_FS1010	01 Apr 22	$Y = 1.0033x + 0.5758$	0.9999
BKK_FS1011	01 Apr 22	$Y = 1.0234x + 0.1759$	0.9996
BKK_FS1012	01 Apr 22	$Y = 1.0106x - 2.0048$	0.9997
BKK_FS1013	01 Apr 22	$Y = 0.9677x - 35.851$	0.9997
BKK_FS1014	01 Apr 22	$Y = 1.0021x + 0.3148$	0.9998
BKK_FS1015	01 Apr 22	$Y = 0.9994x + 1.786$	1.0000
BKK_FS1016	01 Apr 22	$Y = 1.0105x - 80.256$	0.9998
BKK_FS1017	01 Apr 22	$Y = 0.9995x + 0.649$	1.0000
BKK_FS1018	01 Apr 22	$Y = 1.0011x + 1.1786$	1.0000
BKK_FS1019	01 Apr 22	$Y = 1.0023x - 68.424$	0.9996
BKK_FS1020	01 Apr 22	$Y = 1.0547x - 0.666$	0.9998
BKK_FS1021	01 Apr 22	$Y = 1.018x - 3.3286$	0.9998
BKK_FS1022	01 Apr 22	$Y = 0.9932x - 57.035$	0.9986
BKK_FS1023	01 Apr 22	$Y = 1.0094x + 0.0717$	0.9999
BKK_FS1024	01 Apr 22	$Y = 1.0042x + 0.4086$	0.9997



ROTA METER CALIBRATION RESULT APRIL 2022

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS1025	01 Apr 22	$Y = 1.0132x - 88.507$	0.9996
BKK_FS1026	01 Apr 22	$Y = 1.0018x + 1.0776$	0.9997
BKK_FS1027	01 Apr 22	$Y = 1.0053x + 0.231$	0.9995
BKK_FS1028	01 Apr 22	$Y = 0.9792x - 60.312$	0.9982
BKK_FS1029	01 Apr 22	$Y = 0.9935x + 0.8234$	1.0000
BKK_FS1030	01 Apr 22	$Y = 1.0039x + 0.515$	0.9999
BKK_FS1031	01 Apr 22	$Y = 1.009x - 79.295$	0.9998
BKK_FS1039	01 Apr 22	$Y = 0.9868x + 7.8119$	0.9993
BKK_FS1040	01 Apr 22	$Y = 1.0096x - 7.2905$	0.9990
BKK_FS1041	01 Apr 22	$Y = 1.076x - 2.0503$	0.9999
BKK_FS1042	01 Apr 22	$Y = 1.0054x + 1.6095$	0.9995
BKK_FS1043	01 Apr 22	$Y = 1.0108x - 11.048$	0.9999
BKK_FS1044	01 Apr 22	$Y = 1.0468x - 0.9391$	0.9997
BKK_FS1161	01 Apr 22	$Y = 1.0126x + 0.7738$	0.9999
BKK_FS1162	01 Apr 22	$Y = 0.9994x + 2.6357$	0.9995
BKK_FS1163	01 Apr 22	$Y = 0.977x - 55.03$	0.9987
BKK_FS1164	01 Apr 22	$Y = 0.9914x + 0.8427$	0.9997
BKK_FS1165	01 Apr 22	$Y = 0.9893x + 6.5919$	0.9998
BKK_FS1166	01 Apr 22	$Y = 1.0031x - 77.881$	0.9996
RYG_FS0197	01 Apr 22	$Y = 1.0055x + 1.1914$	0.9998
RYG_FS0198	01 Apr 22	$Y = 0.996x + 23.788$	0.9996
RYG_FS0199	01 Apr 22	$Y = 1.1166x - 3.3942$	0.9998

Review By :

(Mr. Wichan Choonharat)

Enviro Field Services Manager

Approved By :

(Mr. Sarayuth Jittrantont)

Assistant General Manager

Sartorius (Thailand) Co., Ltd.

129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310

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

**SARTORIUS**

Certificate

of Calibration

REVIEW BY	Thamita K.
APPROVED BY	D. [Signature]
NEXT CAL. DATE	6/5/22

Model Number : **MSE125P-100-DU**

Description : **Semi-micro Balance**

Serial Number : **33108993 (RYG_EN0004)**

Manufacturer : **Sartorius**

Certificate No. : **21BCI0164**

Issued Date : **Monday, May 10, 2021**

Reference No. : **501644**

Page No. : **1 Of 3**

Customer Name : **ALS Laboratory Group (Thailand) Co., Ltd.(Rayong Branch)**
616/10 Moo 5 T.Maenam Khu, A.Pluakdaeng, 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 : **Thursday, May 06, 2021**

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

Metrological data :

Capacity : **60 / 120** g Readability : **0.01/0.1** mg

Ambients Conditions:

Temperature : **21.4 °C** ± **5.0 °C**

Humidity : **50.0 % 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 from list of Sartorius Metrological Specifications.

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 200g E2,YCS011-522-00	Sartorius	119934 D-K-19398-01-00	10-Sep-2021
MHB-382SD	Humidity/Barometer/Temp Lutron MHB-382SD	SPC-RT	C19203076	1-Sep-2021

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.

ISO17025-RF-015 26/03/2020 R2


 MrChonchai Inthana(Technical Manager)

S
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Certificate

of Calibration

Model Number : **MSE125P-100-DU**
 Description : **Semi-micro Balance**
 Serial Number : **33108993 (RYG_EN0004)**
 Manufacturer : **Sartorius**

Certificate No. : **21BCI0164**
 Issued Date : **Monday, May 10, 2021**
 Reference No. : **501644**
 Page No. : **2 of 3**

Calibration Results : Without Adjustment

Repeatability

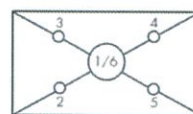
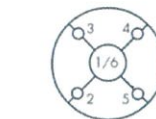
The reproducibility is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.

Nominal Value : (Low Load)	5.00002	50.00004
5 g	5.00001	50.00004
Tolerance	5.00001	50.00005
0.000015 g	5.00002	50.00004
	5.00002	50.00003
Nominal Value : (High Load)	5.00002	50.00003
50 g	5.00001	50.00003
Tolerance	5.00003	50.00004
0.000015 g	5.00001	50.00003
	5.00002	50.00004
Standard Deviation	0.000007	0.000007

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 : 50 g
 Tolerance 0.00015 g



	Difference
1	—
2	0.00000
3	-0.00002
4	0.00000
5	-0.00002
6	—

Linearity

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

Tolerance 0.00004 g

Nominal Value (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
0.01	0.00000	0.00000	0.00000	0.000016
0.05	0.05000	0.05000	0.00000	0.000016
0.1	0.10000	0.10000	0.00000	0.000017
0.5	0.50000	0.50000	0.00000	0.000018
1	1.00000	1.00000	0.00000	0.000019
5	5.00002	5.00002	0.00000	0.000024
10	10.00003	10.00003	0.00000	0.000047
20	20.00001	20.00002	0.00001	0.000089
40	40.00005	40.00004	-0.00001	0.000089
50	50.00005	50.00003	-0.00002	0.000089

Certificate

of Calibration

Model Number : MSE125P-100-DU

Description : Semi-micro Balance

Serial Number : 33108993 (RYG_EN0004)

Manufacturer : Sartorius

Certificate No. : 21BCI0164

Issued Date : Monday, May 10, 2021

Reference No. : 501644

Page No. : 3 of 3

Calibration Results : Without Adjustment

Repeatability

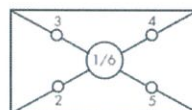
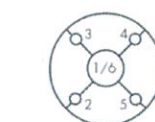
The reproducibility is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.

Nominal Value : (Low Load)	100.0000
g	100.0000
Tolerance	100.0000
0.000015 g	100.0000
	100.0000
	100.0000
Nominal Value : (High Load)	100.0000
100 g	100.0000
Tolerance	100.0000
0.000015 g	100.0000
	100.0000
	100.0001
Standard Deviation	0.00003

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 : 50 g
Tolerance 0.00015 g



	Difference
1	-
2	-
3	-
4	-
5	-
6	-

Linearity

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

Tolerance 0.0001 g

Nominal Value (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
65	65.0001	65.0001	0.0000	0.00016
70	70.0001	70.0001	0.0000	0.00016
75	75.0001	75.0001	0.0000	0.00016
80	80.0001	80.0001	0.0000	0.00016
85	85.0001	85.0001	0.0000	0.00016
90	90.0001	90.0000	-0.0001	0.00016
95	95.0001	95.0000	-0.0001	0.00017
100	100.0001	100.0000	-0.0001	0.00017
110	110.0001	110.0000	-0.0001	0.00026
120	120.0001	120.0000	-0.0001	0.00026

End of Report



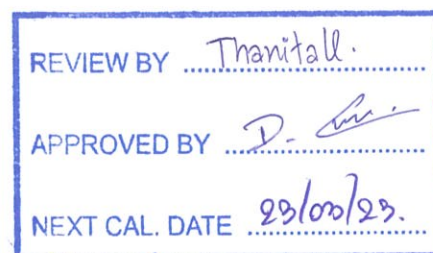
Certificate of Calibration



Represent to Certificate of Calibration ,PTC/07/22104

Certificate No.:	PTC/07/22104	Page:	1 of 3
Equipment:	Digital Balance	Condition:	Normal
Manufacturer:	Sartorius	Serial No:	33108993
Model:	MSE125P-100-DU	ID No:	RYG_EN0004
Type of Balance:	Single interval		

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



Environment Condition: Temperature 23.9 °C ± 0.3 °C
 Humidity 58.1 %RH ± 4.4 %RH
 Air density 1.17 kg/m³

Calibration Place: ALS Laboratory Group (Thailand) Co.,Ltd.
 616/10 Moo 5 T.Maenamkoo, A.Pluakdaeng,
 Rayong 21140, Thailand

The Method used: In house method, PTC-WI-07, base on Euramet cg. 18

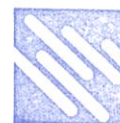
Traceability: This certificate is traceable to the SI Units through Thai Calibration Service Co.,Ltd.
 , NSC-ONSC Accreditation No.: Calibration 0189

Date Received: March 23, 2022

Calibration Date: March 23, 2022

Issued Date: March 25, 2022

Calibration By: Mr. Rungroje Metakul



PENTA CALIBRATION CO.,LTD

(Mr.Kriangsak Kalasri)

Reviewed by

Approved By :

(Mr. Keattisak Kerdto)

Laboratory Manager

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 recognised 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). The effect that the results relate only to the items calibrated.

This calibration certificate shall not be reproduced except in full only, without written approval from penta calibration co ., ltd



Represent to Certificate of Calibration ,PTC/07/22104

Certificate No.: PTC/07/22104

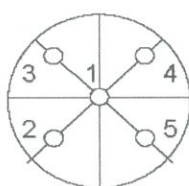
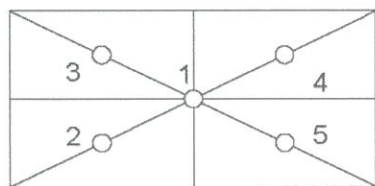
Page: 2 of 3

Measurement Results:

Without Adjustment :

Function Calibration: Non Adjustment

Eccentric Error: Weight to be 1/3 ,1/2 or of Maximum capacity



Eccentricity test 50 (g)

Position (g)				
1	2	3	4	5
0.00000	-0.00004	-0.00001	0.00000	0.00001
Maximum deviation:			0.00004	

Repeatability Test : Weight to be $1/2 \leq L_1 \leq$ Maximum capacity

Determination of the standard deviation of weighing balance., Readability 0.00001 (g)

Nominal test value (g)	Standard Deviation
50	0.000007

Error of indication : from nominal value., Readability 0.00001 (g)

Nominal Value (g)	Conventional Mass (g)	Indication (g)	Correction of Balance (g)	Uncertainty (g)	k
0	0.000000	0.00000	0.00000	0.000020	2.65
0.01	0.010001	0.01000	0.00000	0.000022	2.17
0.05	0.050002	0.04999	0.00001	0.000022	2.17
0.1	0.099999	0.09999	0.00001	0.000022	2.17
0.5	0.500001	0.50001	-0.00001	0.000022	2.17
1	1.000004	0.99999	0.00001	0.000022	2.14
2	1.999999	1.99999	0.00001	0.000022	2.14
5	5.000015	4.99999	0.00002	0.000023	2.14
10	10.000004	10.00000	0.00000	0.000024	2.10
20	20.000029	20.00000	0.00003	0.000032	2.00
50	50.000043	49.99999	0.00005	0.000069	2.00

Note: Weight of adjust - (g)



Represent to Certificate of Calibration ,PTC/07/22104

Certificate No.: PTC/07/22104

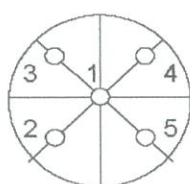
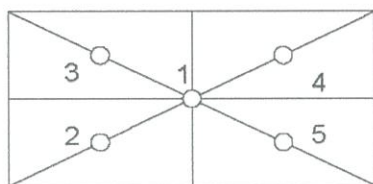
Page: 3 of 3

Measurement Results:

Without Adjustment :

Function Calibration: Non Adjustment

Eccentric Error: Weight to be 1/3 ,1/2 or of Maximum capacity



Eccentricity test 50 (g)

Position (g)				
1	2	3	4	5
0.0000	0.0000	0.0000	0.0000	0.0000
Maximum deviation:				0.0000

Repeatability Test : Weight to be $1/2 \leq L_1 \leq$ Maximum capacity

Determination of the standard deviation of weighing balance., Readability 0.0001 (g)

Nominal test value (g)	Standard Deviation
100	0.00000

Error of indication : from nominal value., Readability 0.0001 (g)

Nominal Value (g)	Conventional Mass (g)	Indication (g)	Correction of Balance (g)	Uncertainty (g)	k
65	65.00006	65.0000	0.0001	0.00013	2.00
70	70.00007	70.0000	0.0001	0.00013	2.00
75	75.00009	75.0000	0.0001	0.00014	2.00
80	80.00008	80.0000	0.0001	0.00014	2.00
85	85.00009	85.0000	0.0001	0.00015	2.00
90	90.00010	90.0000	0.0001	0.00015	2.00
95	95.00012	95.0000	0.0001	0.00016	2.00
100	100.00004	100.0000	0.0000	0.00014	2.00
110	110.00004	110.0000	0.0000	0.00015	2.00
120	120.00007	120.0000	0.0001	0.00016	2.00

Note: Weight of adjust - (g)

The End of Certificate

Certificate of System Qualification

GC-OQ

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

Date: October 21, 2021 10:05:40 AM
EQP Name: AgilentRecommended
EQP Revision: GC.02.50
Overall Qualification Status: Pass

REVIEW BY Suchada T.
APPROVED BY Sararat M.
NEXT CAL. DATE 21 Apr 2023

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: 0.0 psi /5 minutes

Agilent Recommended: ≥ -2.0 and ≤ 0.5

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890

Front SSL

Date: October 21, 2021 10:05:40 AM

System ID: GC-6

Setpoint Status:

Pass

	Setpoint		Actual	
Inlet Pressure:	25.0	psi	24.9	psi
Accuracy:			0.1	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

Setpoint Status:

Pass

	Setpoint		Actual	
Inlet Pressure:	25.0	psi	24.9	psi
Accuracy:			0.1	psi
Agilent Recommended:			<= 1.2	

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Date: October 21, 2021 10:05:40 AM
System ID: GC-6

Name: 7890
Front FID

Setpoint Status: Pass

Flow Type: Fuel

Setpoint: 30.0 mL/min Measured Flow: 30.5 mL/min

Accuracy: 0.5 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: 394.0 mL/min

Accuracy: 6.0 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: 24.2 mL/min

Accuracy: 0.8 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:

29.1

mL/min

Accuracy:

0.9

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:

397.3

mL/min

Accuracy:

2.7

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:

24.4

mL/min

Accuracy:

0.6

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:

October 21, 2021 10:05:40 AM

System ID:

GC-6

Setpoint Status:

Pass

Zone:

Oven

Setpoint/Actual

Temperature:

230.0 231.5 °C

Accuracy:

1.5 °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:

100.0 100.5 °C

Accuracy:

0.5 °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:

100.0 100.4667 °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

Date:

October 21, 2021 10:05:40 AM

System ID:

GC-6

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:

12.7 pA

ASTM Noise

pA

0.06

<=

0.10

Drift

pA/Hr

0.10

<=

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:

0.42

%

Retention Time RSD:

0.16

%

Agilent Recommended:

<=

3.00

<=

1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Date:

October 21, 2021 10:05:40 AM

System ID:

GC-6

Tested Combination1 Front SSL / Front FID

Injection Tower

Name: 7890

Setpoint Status: Pass

Signal to Noise: 1174861

Agilent Recommended: >= 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 uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination2 Back SSL / Back FID

Name: 7890

Setpoint Status: Pass

Base Signal: 10.4 pA

ASTM Noise

pA

0.05

Agilent Recommended:

<= 0.10

Status:

Pass

Drift

pA/Hr

0.00

<= 2.50

Pass

Date: October 21, 2021 10:05:40 AM

System ID: GC-6

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:

1.16

%

Retention Time RSD:

0.12

%

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:

805466

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	GC-6
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	CN10340103
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	CN16280128
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
Component ID/Asset No.	GC-6
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:	Suriya Thongkaew
Logged On User Name:	suriya.thongkaew@non.agilent.com
Signature Creation Date:	October 21, 2021
Reason for Signature:	Executed protocol and published this original version of document

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User Name: suriya.thongkaew

System Id: GC-6

Hostname: ASBKkW7015

Print Date: October 21, 2021 10:05:46 AM

OQ GC ALS CN11461066 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 20, 2021 12:18:50 PM	Audit	SessionCreated	Session	None
October 20, 2021 12:18:50 PM	Start	Configuration	Session	None
October 20, 2021 12:18:50 PM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
October 20, 2021 12:24:57 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]
October 20, 2021 12:25:02 PM	End	Configuration	Session	None
October 20, 2021 12:25:09 PM	Start	Qualification	Session	OQ
October 20, 2021 12:25:09 PM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
October 20, 2021 12:30:25 PM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1
October 20, 2021 12:56:29 PM	Start	Execution	Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None

User Name: suriya.thongkaew

System Id: GC-6

Hostname: ASBKKW7015

Print Date: October 21, 2021 10:05:46 AM

OQ GC ALS CN11461066 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 20, 2021 1:02:16 PM	End	Execution	Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	Run Count : 1
October 20, 2021 1:02:18 PM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
October 20, 2021 1:02:26 PM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
October 20, 2021 1:02:29 PM	Start	Execution	Inlet Pressure Decay - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
October 20, 2021 1:04:21 PM	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
October 20, 2021 1:07:53 PM	Start	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
October 20, 2021 1:08:11 PM	End	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
October 20, 2021 1:08:16 PM	Start	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None
October 20, 2021 1:20:23 PM	Audit	Data	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 20, 2021 1:20:26 PM	End	Execution	Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1

Page 2 / 10