

ภาคผนวก ช

สำเนาหนังสือรับรองห้องปฏิบัติการวิเคราะห์เอกชน

Certificate of Calibration

TEMPERATURE CONTROLLER ENCLOSURES



Certificate No.: MC 2307702

Page 1 of 3



Customer : Water Analysis Center Co., Ltd.
1/94 Moo 5, T.Kanham, A.U-Thai, Ayutthaya 13210.

Reference Job No. : 23-1577 Received Date : 11 July 2023
Description : Refrigerator
Manufacturer : SANDEN INTERCOOL Model : SEC-1500SBD
Serial No. : SEC1500201A-0708-00304 ID. No. : WWL0038
Marking : Additionally for the purpose of identification by this laboratory a label marked with this certificate number (MC 2307702) has been attached to the case.
Method : In-House calibration procedure MWI-T-033 this method is reference to TLAS G-20 "Temperature Controlled Enclosures".
Location of Calibration : Water Analysis Center Co., Ltd. ; Laboratory.
Environmental Conditions : Ambient Temperature : (25.3 to 25.9) °C
Relative Humidity : (65.2 to 67.9) %
Date of Calibration : 11 July 2023 Date of Issue : 12 July 2023

Checked by : Thanagorn Approved by : Aitipong
Thanagorn Linchaichareon Aitipong Kanjirawasi
(Calibration Supervisor) (Technical Manager)

The uncertainties are for a confidence probability of approximately 95%

This certificate is issued in accordance with the conditions of accreditation granted by the National Standardization Council of Thailand-Office of the National Standardization Council that has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of Master Calibration Co.,Ltd.

[MCF-Q-077 ; Rev.6 ; Date : 22/04/2021]

Certificate No.: MC 2307702

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The Reference Standard Instrument :

Description	Certificate No.	Serial No.	Due date	Traceable thru
Data Acquisition/Switch Unit	MC 2303173	MY41010916	9 Mar 2024	MCAL

With Thermocouple Type " T " ID. No.17/1 to 17/9

Traceability :

The measurement standard traceable to the international system of units (SI) through certificate as mentioned above

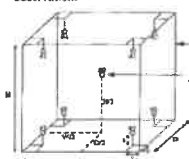
1. Calibration Procedure:

This instrument was calibration according to TLAS G-20 by comparison with calibrated thermocouple type T under no load condition. The Thermocouples were placed on nine points and located one thermocouple in each of the eight corners of the chamber and was away from the each wall of 5 cm to 10 cm. And placed the ninth thermocouple within 2.5 cm of the geometric center of the chamber.

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. The reference sensor should preferably be located at the geometric center of the chamber.

Temperature Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

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



Overall Ambient Temperature around the Chamber variation : 3.2 °C

Overall Line Voltage variation : 0.1 V

Chamber Size (W*H*D) : 171 cm x 157 cm x 60 cm

Checked by : Thanagorn

[MCF-Q-077 ; Rev.6 ; Date : 22/04/2021]

Certificate No.: MC 2307702

Page 3 of 3

2. Result of calibration :

Temperature Measurement Accuracy Test

Indicating Temperature (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (±°C)
	#1	#2	#3	#4	#5	#6	#7	#8	Ref.#9	
2.5	4.4	4.2	4.2	4.2	4.0	3.9	4.1	4.0	3.8	0.86

Chamber Characterization Result

Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
2.0	2.5	1.50	1.01	3.3

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 %.

This certificate will certify of the calibrated equipment only.

End of Certificate

Checked by : Thanagorn

[MCF-Q-077 ; Rev.6 ; Date : 22/04/2021]

ภาคผนวก ข-2

CERTIFICATE OF CALIBRATION

Certificate No.: C0-1907007/23

Page 1 of total 2 pages

Customer : WATER ANALYSIS CENTER CO., LTD.
1/94 Moo 5, T.Kanham,
A.U-thai, Ayutthaya 13210

Equipment : Conductivity Meter
Manufacturer : EUTECH Model : CON 2700
Serial No. : 2657889 ID No. : WWL 0136
Description : -

Environmental Conditions : Ambient Temperature: (20 ± 2) °C
Relative Humidity: (50 ± 10) %
Atmospheric Pressure: -

Calibration Location : Jayhawk Laboratory (CL&GL)

Received Date : 19 July 2023

Calibration Date : 19 July 2023

Date of Issue : 20 July 2023

Condition of Artifacts : Used conditions but can be calibrated

Checked by : [Signature]

Act as Technical Manager

Approved by : [Signature]

Representative of Managing Director

() (Krisyool K.) () (Sakda Y.) (Dr. Ekachai Puttiewong)
() (Paniphan K.) () (Onnaga P.)
() (Pongsak H.) () (Nitiphong K.)
() (Kanung C.) () (Nonthachai K.)
() (Pramong P.) () (Noppol P.)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of the Thai Heart Calibration Co., Ltd.

FE-169

REV.02 02/24/21



THANHEART CALIBRATION CO., LTD.

22/11/2023 10:00:00 AM

22/11/2023 10:00:00 AM

AUTOMATION SERVICE CO., LTD.
CALIBRATION LABORATORY

SV 201005/2024

Cert. No. WAC-065
Page 1 of 2

Certificate No.: CO-1907007/23

Page 2 of total 2 pages

Reference Method:

- The calibration method used was CP-177 based on an in-house method.
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard:

Material	Batch Value	Lot Number	Due Date	Traceability
Conductivity Standard Solution	147.8 $\mu\text{S/cm}$	S220611005	Dec. 6, 2023	SCP Science
	1.425 mS/cm	S220812006	May 31, 2024	

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:
- SCP Science.

Measurement Results: (Probe Serial No.: 93X219063)

Conductivity Standard Solution	Measured Value	Correction	Uncertainty (\pm)
147.8 $\mu\text{S/cm}$	147.5 $\mu\text{S/cm}$	0.3 $\mu\text{S/cm}$	2.5 $\mu\text{S/cm}$
1.425 mS/cm	1.427 mS/cm	-0.002 mS/cm	0.0051 mS/cm

Note: Adjustment points: 147.8 $\mu\text{S/cm}$, 1.425 mS/cm

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

- End of Certificate -

Calibrated by: Onnape
REV.02 02/24/21

FE-169

AUTOMATION SERVICE CO., LTD.
CALIBRATION LABORATORYInstrument : DO Meter
Model : DO-31P
Serial No. : 789065Cert. No. WAC-065
Page 2 of 2

Calibrate Procedure

- ☐ This instrument was calibrated by comparison with standard solution (PH/ORP)
- ☐ This instrument was calibrated by comparison with scattering plate value (Turbidity)
- ☐ This instrument was calibrated by comparison with conductivity (Conductivity)
- ☒ This instrument was calibrated by comparison with Sodium sulfite anhydrous (DO)

Condition of this result of calibration

1). Reference Standard Solution

Standard	Lot No	Batch	Cert. No.	Due Date
Sodium Sulfite Power	408K1405	-	-	-

2). Traceability This certification is traceable to

- ☒ Kanto Chemical Co., INC.
- ☐ DKK Corporation

Result Of Calibration

Standard Solution (mg/l) at 25.7°C	Before Adjust		After Adjust	
	Indicator	Error	Indicator	Error
Zero	0.00	0.10	0.00	-
Span	8.02	6.45	8.02	-

DO Electrode No. OE270AA(5) S/N 111F0029

Calibrated By: P. Yooyen
(Ms. Phanee Yooyen)
Technician

CERTIFICATE OF CALIBRATION

Instrument : DO Meter
Model : DO-31P
Serial No. : 789065
Manufacturer : TOA-DKK
Measuring Range : 0.00 ~ 20.00 mg/l

Machine : -
Location : -

Customer : Water Analysis Center Co., Ltd.
1/94 Moo.5 T.Kanham, A.U-Thai
Ayutthaya 13210 Thailand

Date Of Received : 11 / 01 / 2024
Date Of Calibration : 11 / 01 / 2024

Ambient Condition : Temperature 26 °C
Humidity 58 % RH

Calibrated By: P. Yooyen
(Ms. Phanee Yooyen)
Technician

Approved By: N. Nongnomsak
(Mr. Nipon Nongnomsak)
Technical Manager

Date Of Issue : 15 / 01 / 2024

This Certificate may not be reproduced other than in full, except with the prior written approval of the head of the industrial instruments calibration center.

Automation Service Co., Ltd. 932/9071 Soi Pathanakittham Pathanakittham Rd. Samsung, Samsung Bangkok 10260
Tel : 02-015-8994 ext. 711-721 E-mail : info@automation.co.th, service@automation.co.th, www.automation.co.th



Inctech Metrological Center Co., Ltd.
33/1 Soi 82, Sukhapiban 5 Rd., O ngoon,
Salmat, Bangkok 10220, Thailand
Tel. (062) 909-5820 (Auto 10 lines) www.imctrust.com



Certificate of Calibration

Certificate No. : MT24-3208
Page : 1 of 2

Customer : Water Analysis Center Co., Ltd.
Address : 1/94 M.5, Rojana Industrial Park, T.Kanham, A.U-Thai, Ayutthaya 13210

Description : Hot Air Oven
Manufacturer : Memmert
Model : UF 250
Serial No. : B620.0814
Identification No. : WVVL 0212
Calibration Place : Customer Laboratory

Order No. : 1152/24
Received date : Mar 22, 2024
Calibration date : Mar 22, 2024
Environment Condition:
Temperature : (25 \pm 10) °C
Humidity : (50 \pm 30) %RH

Calibration Method : Calibration were conducted using In-house calibration procedure CP-M7-005 According to comparison with LXI Data Acquisition Switch Unit with sensor. The calibration methods based on Euramet Calibration Guide No.20 - guidelines on the Calibration of Temperature and/or Humidity Controlled Enclosures.

Reference Standard Instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
LXI Data Acquisition Switch Unit with Sensor	34972A	MY49020096	MT23-7163	Nov 30, 2024

The effect that the result relate only to the items calibrated. It was found accurate as shown on date and place of calibration only.

Traceability : This measurement are traceable to the International System of Unit (SI), through National Institute of Metrology Thailand (NIMT)

The reported expanded uncertainty of measurement was based on standard uncertainty multiplied by coverage factor $k = 2$, providing a level of confidence of not less than 95%

Calibrated by : Mr.Yutakorn Jannasarnai

Approved by : Mr. Panuwat Phukan
Issue date : Apr 10, 2024

This calibration certificate shall not be reproduced other than in full except with the prior written approval of Inctech Metrological Center Co., Ltd

Rev.03 / Feb 2024

FM-MT-013

Automation Service Co., Ltd. 932/9071 Soi Pathanakittham Pathanakittham Rd. Samsung, Samsung Bangkok 10260
Tel. 02-015-8994 ext. 711-721 E-mail : info@automation.co.th, service@automation.co.th, www.automation.co.th

พิมพ์งาน ๓-3

Certificate No. : MT24-3208

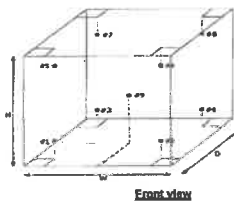
Page : 2 of 2

Function : Temperature measurement
Calibration point : 104, 180 °C

Result : Without adjustment
Resolution : 0.1 °C

Calibration point (°C)	Temperature of IUUC* at each position (°C)									Uncertainty of measurement (± °C)
	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Ch.8	Ch.9	
104	103.494	103.933	103.871	103.988	103.990	104.081	103.843	104.217	104.022	0.45
180	179.895	179.953	180.047	179.985	179.908	180.088	180.065	180.273	180.105	0.54

Setting temperature (°C)	Indicating Temperature (°C)	Measured stability (± °C)	Measured uniformity (°C)	Overall variation (°C)
104.0	104.0	0.34	0.86	1.3
180.0	180.0	0.41	0.86	1.2



- #1 Lower Left Front
- #2 Lower Right Front
- #3 Lower Left Rear
- #4 Lower Right Rear
- #5 Upper Left Front
- #6 Upper Right Front
- #7 Upper Left Rear
- #8 Upper Right Rear
- #9 Geometric Center

Front view

IUUC* = Unit under calibration

Uniformity = Maximum and Minimum difference of measured temperature at any probes and the measured temperature at the reference and same time.

Overall Variation = Difference of temperature value between the maximum and minimum any time.

Stability = One half of the maximum difference of measured temperatures at any one probe.

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FM-MT-013

Rev.03 / Feb 2024



Certificate of Calibration

Equipment: Balance
Model: BL 210S
Serial No. (or ID.): 15808131 (MNL 0022)
Manufacturer: Sartorius
Condition: In condition

Certificate No.: C01241754
Issued Date: 05 June 2024
Job No.: WO-00030302
Page: 1 of 2

Customer: Water Analysis Center Co., Ltd.
1/84 Moo 5, Rojana Industrial Park, Rojana Road,
Tambol Kanham, Amphur U-Thai, Ayutthaya 13210 Thailand

Environment Condition: Temperature 26 °C ± 0.2 °C
Humidity 50 %RH ± 2.6 %RH

Calibration Place: Water Analysis Center Co., Ltd. (วัดน้ำอึ้ง)
1/84 Moo 5, Rojana Industrial Park, Rojana Road,
Tambol Kanham, Amphur U-Thai, Ayutthaya 13210 Thailand

Calibration By: Mr. Polawad Ruamrup
Calibration Date: 05 June 2024
The Method used: In-house method, CAL-WI-47, based on UKAS Lab 14
Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Co., Ltd. Certificate No. C02240400

Mr. Polawad Ruamrup
(Mr. Polawad Ruamrup)
Person in charge

Mr. Rungrod Jenkitrakulcha
(Mr. Rungrod Jenkitrakulcha)
Authorized signatory

This certificate is issued in 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 laboratory.
The measurement uncertainty related to 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.

DKSH Technology Limited
2621 Moo 5, Rojana Industrial Park, Rojana Road, Rojana, Bangkok 10220
2621 Sukhaphiban 5 Road, Rojana, Bangkok 10220
Phone: +66 2629 7029 Email: info@dksh.com Website: www.dksh.com/thailand-thailand

Delivering Growth - In Asia and Beyond.

CAL-FM-C01-14; 12 Sep 2022



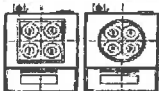
Certificate No.: C01241754

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Calibration Results:

Without Adjustment

Isocentric Error: Weight to be 1/3 or 1/2 of Maximum capacity, taken from the center of the pan as a zero reference.



Nominal Test Value		100		(g)	
Reference Points (g)					
A	B	C	D	E	
-	0.0000	0.0001	0.0000	-0.0002	

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

Nominal test value (g)	Standard Deviation
20	0.00004
200	0.00008

Error of indication from nominal or conventional mass value. Readability 0.0001 (g)

Nominal Value (g)	Conventional Mass (g)	Displayed Value (g)	Error of Indication (g)	Uncertainty (g)	k
1	1.00001	1.0000	0.0000	0.00011	2.04
2	2.00002	2.0000	0.0000	0.00011	2.04
5	5.00002	5.0000	0.0000	0.00011	2.04
10	10.00001	10.0000	0.0000	0.00011	2.04
20	20.00001	20.0000	0.0000	0.00012	2.03
50	50.00003	50.0000	0.0000	0.00013	2.02
70	70.00004	70.0000	0.0000	0.00015	2.01
100	99.99996	100.0001	0.0001	0.00017	2.01
120	119.99997	120.0002	0.0002	0.00021	2.00
150	149.99999	150.0002	0.0002	0.00024	2.00
200	199.99996	200.0004	0.0004	0.00030	2.00

The End of Certificate

DKSH Technology Limited
2621 Moo 5, Rojana Industrial Park, Rojana Road, Rojana, Bangkok 10220
2621 Sukhaphiban 5 Road, Rojana, Bangkok 10220
Phone: +66 2629 7029 Email: info@dksh.com Website: www.dksh.com/thailand-thailand

Delivering Growth - In Asia and Beyond.

CAL-FM-C01-14; 12 Sep 2022



บริษัท ไทยยูนิค จำกัด

THAI UNIQUE CO., LTD.

80-82 ถนนประชาธิปไตย แขวงบางจาก เขตพระนคร กรุงเทพมหานคร 10200
80-82 Prachathipai Rd., Bangkokthrom, Pranakom, Bangkok 10200
Tel. 0-2629-6191-4, 0-2280-1781, Fax. 0-2280-4788, E-mail: th@thaiunique.com, Website: www.thaiunique.com

PREVENTATIVE MAINTENANCE (PM) CHECK LIST FOR ATOMIC ABSORPTION SPECTROMETER

Model & Serial Number: 240FS AA & M418250004
Customer: Water Analysis Center Co., Ltd.
Date: 25 Apr 2024

- Safety
- ☒ Flame, Inspect/replace o-ring nebulizer, spray chamber and burner
 - ☒ Flame, Clean nebulizer, spray chamber and burner
 - ☒ Flame, Check liquid trap interlock, burner interlock, pressure relief bong interlock and shield interlock
 - ☐ Furnace, Clean work head, electrode and shroud N/A
 - ☐ Furnace, Clean PSD and PSD tray N/A
 - ☐ Furnace, Check water pressure N/A
 - ☒ Check drain tube
 - ☒ Check exhaust system
 - ☒ Check gas pressure sensor interlock
 - ☒ Check and all gas hoses for SpectraAA
 - ☒ Clean computer control
- Optics
- ☒ Inspect/Replace the external optics surfaces
 - ☒ Check Wavelength Accuracy the copper line at 323.0-326.0 nm = 324.7 nm
 - ☒ Check the PMT % Gain the copper at 324.8 nm, 4 mA, 0.5 nm slit width, Gain ~2.9% (should be ≤ 64% or ≤ 380V)
 - ☒ Flame, Check D2 lamp is work

Electronics

- ☒ Check power supply voltage
- ☒ Check cables and connectors
- ☒ Check/Clean all boards in the instrument
- ☐ Furnace, Check camera and align** N/A

**Option for Graphite Zeeman only

Mechanisms

- ☒ Flame, Check the burner adjuster
- ☐ Furnace, Check PSD accessories N/A

Analytical performance

- ☒ Clear the sample compartment
- ☒ Flame, Check uptake rate from 7.2-10.6 mL per minute = 8.5 mL/min
- ☒ Test Photometric noise, STDV = 0.0001 Abs (should be ≤ 0.00050 Abs)
- ☒ Flame, Test high solids nebulizer setting use
- A1600 Cu 5 ppm = 0.79 Abs, and Precision
- (%RSD) = 0.4 % (should be > 0.55 Abs and $< 0.5\%$ RSD)
- or
- N20/A60 Cu 5 ppm = _____ Abs, and Precision
- (%RSD) = _____ % (should be > 0.3 Abs and $< 0.5\%$ RSD)
- ☐ Furnace, Characteristic mass and sensitivity Cu 25 ppb = _____ Abs, and N/A
- Precision (%RSD) = _____ % (should be ≥ 0.15 Abs and $\leq 4.0\%$ RSD)

SIGN:

Engineer: Suniga Mecharoen Customer: Water Analysis Center Co., Ltd.

2/2

PREVENTATIVE MAINTENANCE (PM) CHECK LIST

FOR ATOMIC ABSORPTION SPECTROMETER

Model & Serial Number: 2402 AA & M418230004

Customer: Water Analysis Center Co., Ltd.

Date: 26 Apr 2024

Safety

- ☐ Flame, Inspect/replace O-ring nebulizer, spray chamber and burner N/A
- ☐ Flame, Clean nebulizer, spray chamber and burner N/A
- ☐ Flame, Check liquid trap interlock, burner interlock, pressure relief bung N/A
- interlock and shield interlock
- ☒ Furnace, Clean work head, electrode and shroud
- ☒ Furnace, Clean PSD and PSD tray
- ☒ Furnace, Check water pressure
- ☒ Check drain tube
- ☒ Check exhaust system
- ☒ Check gas pressure sensor interlock
- ☒ Check and all gas hoses for SpectraAA
- ☒ Clean computer control

Optics

- ☒ Inspect/Replace the external optics surfaces
- ☒ Check Wavelength Accuracy the copper line at 323.0-326.0 nm = 324.8 nm
- ☒ Check that PMT % Gain the copper at 324.8 nm, 4 mA, 0.5 nm slit width, Gain = 50% (should be $\leq 64\%$ or $\leq 380V$)
- ☐ Flame, Check D2 lamp is work N/A

1/2

Electronics

- ☒ Check power supply voltage
- ☒ Check cables and connectors
- ☒ Check/Clean all boards in the instrument
- ☒ Furnace, Check camera and align**

**Option for Graphite Zeeman only

Mechanisms

- ☐ Flame, Check the burner adjuster N/A
- ☒ Furnace, Check PSD accessories

Analytical performance

- ☒ Clear the sample compartment
- ☐ Flame, Check uptake rate from 7.2-10.6 mL per minute = _____ mL/min N/A
- ☒ Test Photometric noise, STDV = 0.0002 Abs (should be ≤ 0.00050 Abs)
- ☐ Flame, Test high solids nebulizer setting use N/A
- A1600 Cu 5 ppm = _____ Abs, and Precision
- (%RSD) = _____ % (should be > 0.55 Abs and $< 0.5\%$ RSD)
- or
- N20/A60 Cu 5 ppm = _____ Abs, and Precision
- (%RSD) = _____ % (should be > 0.3 Abs and $< 0.5\%$ RSD)
- ☒ Furnace, Characteristic mass and sensitivity Cu 25 ppb = 0.16 Abs, and
- Precision (%RSD) = _____ % (should be ≥ 0.15 Abs and $\leq 4.0\%$ RSD)

SIGN:

Engineer: Suniga Mecharoen Customer: Water Analysis Center Co., Ltd.

2/2

PREVENTATIVE MAINTENANCE (PM) CHECK LIST

FOR ATOMIC ABSORPTION SPECTROMETER

Model & Serial Number: AA 240FS & AA09117073

Customer: Water Analysis Center Co., Ltd.

Date: 12 Feb 2024

Safety

- ☒ Flame, Inspect/replace O-ring nebulizer, spray chamber and burner
- ☒ Flame, Clean nebulizer, spray chamber and burner
- ☒ Flame, Check liquid trap interlock, burner interlock, pressure relief bung
- interlock and shield interlock
- ☐ Furnace, Clean work head, electrode and shroud N/A
- ☐ Furnace, Clean PSD and PSD tray N/A
- ☐ Furnace, Check water pressure N/A
- ☒ Check drain tube
- ☒ Check exhaust system
- ☒ Check gas pressure sensor interlock
- ☒ Check and all gas hoses for SpectraAA
- ☒ Clean computer control

Optics

- ☒ Inspect/Replace the external optics surfaces
- ☒ Check Wavelength Accuracy the copper line at 323.0-326.0 nm = 324.8 nm
- ☒ Check that PMT % Gain the copper at 324.8 nm, 4 mA, 0.5 nm slit width, Gain = 50% (should be $\leq 64\%$ or $\leq 380V$)
- ☒ Flame, Check D2 lamp is work

1/2

PM-SV-01 Rev 01



บริษัท ไทยยูนิค จำกัด THAI UNIQUE CO., LTD.

80-82 ถนนปิ่นเกล้าพิเศษ แขวงบางขุนพรหม เขตพระนคร กรุงเทพมหานคร 10200
80-82 Prachathipatani Rd., Bangkokphum, Pranakorn, Bangkok 10200
Tel. 0-2679-0191-6, 0-2280-1747, Fax. 0-2280-1748, E-mail: thauunique@thauunique.com, Website: www.thauunique.com

Electronics

- ☒ Check power supply voltage
- ☒ Check cables and connectors
- ☒ Check/Clean all boards in the instrument
- ☐ Furnace, Check camera and align** N/A

**Option for Graphite Zirconium only

Mechanisms

- ☒ Flame, Check the burner adjuster
- ☐ Furnace, Check PSD accessories N/A

Analytical performance

- ☒ Clear the sample compartment
- ☒ Flame, Check uptake rate form 7.2-10.6 mL per minute - 9.5 mL/min
- ☒ Test Photometric noise, STDV ~ 0.0002 Abs (should be ≤ 0.00050 Abs)
- ☒ Flame, Test high solids nebulizer setting use
- Air/Acet Cu 5 ppm = 0.78 Abs, and Precision (%RSD) = 0.3 % (should be > 0.55 Abs and $< 0.5\%$ RSD)
- or
- N2O/Acet Cu 5 ppm = Abs, and Precision (%RSD) = % (should be > 0.3 Abs and $< 0.5\%$ RSD)
- ☐ Furnace, Characteristic mass and sensitivity Cu 25 ppb = Abs, and N/A Precision (%RSD) = % (should be ≥ 0.15 Abs and $\leq 4.0\%$ RSD)

SIGN :

Engineer : Sanya Naeharwan Customer : Mr. Kridsada Thinhmatsai

2/2

FB-01/01 Rev. 03



MEGAFIL CO., LTD.

99/183 Moo 3 Tambon Bang Rak Noi Amphur Mueang Nonthaburi 11000
Tel. 0-2528-6081-2 Fax. 0-2528-6083, 0-2525-7034
www.megafil.co.th E-mail: megafilgroup@gmail.com

BSC Certification Test Report

Page 1 of 6

Certificate No. : M1333/23

Customer Name : LABORATORY WATER ANALYSIS CENTER COMPANY LIMITED

Customer Address : 1/94 Moo 5 T.Kanharu, A.U.-Thai,
Phra Nakhon Si Ayutthaya 13210

Equipment : Biological Safety Cabinet Class II Type A2

Manufacturer : Microtech

Model : V6-T

Serial No : 0972

ID No. : WWL 0084

Were in accordance with ☒ EN 12469 ☐ NSF 49 ☐ Manufacturer's specification

Test Date : 12/10/2023

Due Date : 11/10/2024 or after HEPA filters are replaced or unit is moved

Test by : Mr. Puwadol Keawika

Approved by :

(Mr.Kridsada Thinhmatsai)

Authorized Signatory

Issued Date : 16/10/2023

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

This certificate may not be reproduced other than in full except with the prior written approval of the Megafil Company Limited.

Megafil Co., Ltd.

MG-FM-7.8-001, R00 (01/07/19)



MEGAFIL CO., LTD.

99/183 Moo 3 Tambon Bang Rak Noi Amphur Mueang Nonthaburi 11000
Tel. 0-2528-6081-2 Fax. 0-2528-6083, 0-2525-7034
www.megafil.co.th E-mail: megafilgroup@gmail.com

Page 2 of 6

Certificate No. : M1333/23

- Procedure Used :
- European Standard EN12469 : 2000 has the status of British Standard, Biotechnology Performance criteria for microbiological safety cabinets.
 - NSF International Standard / American National Standard NSF / ANSI 49-2008 Biosafety Cabinet : Design, Construction, Performance and Field Certification.
 - Australian Standard : AS 1807.23-2000 Determination of intensity of radiation from germicidal ultraviolet lamps.
 - Manufacturer's specification.

1. Downflow velocity test.

Measurement Information

No. of Rows	No. of Readings	Grid Spacing Front-Back	Grid Spacing Side-Side	Probe height Above sash
2	8	1/4, 3/4	1/8, 3/8	100 mm

Measurement Data. (m/s.)

0.35	0.41	0.42	0.41
0.39	0.34	0.35	0.34

Average velocity 0.38 m/s (75 FPM.) Velocity range 0.35-0.50 m/s (69-96 FPM.)

Uniformity (EN: +20%avg.) 0.30 - 0.46 m/s (60 - 90 FPM.)

Supply filter dimension 24 x 72 (inch x inch) Supply filter area 10.69 SQ.FT

Downflow volume (Q) 802 CFM.

Result Summary ☒ Pass ☐ Fail

Equipment used : Thermo Anemometer Model 425 S/N : 03004786 Calibration date : 16/02/2023

Megafil Co., Ltd.

MG-FM-7.8-001, R00 (01/07/19)

ภาคผนวก ข-6



MEGAFIL CO., LTD.

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Page 3 of 6

Certificate No. : M1333/23

2. Inflow velocity test.

Select method. : ☐ DIM ☒ Exhaust velocity. ☒ MFG's Specifications

MFG's Specifications method

0.56	0.56	0.57	0.56	0.54
0.59	0.54	0.55	0.56	0.57
0.57	0.56	0.57	0.54	0.58
0.56	0.58	0.57	0.58	0.59
0.57	0.54	0.54	0.55	0.57

(m/s.)

Average Inflow velocity 0.47 m/s (93 FPM.) Velocity range 0.40 m/s (79 FPM.)

Inflow dimension 8 x 72 (inch x inch) Inflow area 4.00 SQ.FT

Inflow volume(Q) 372 CFM

Result Summary ☒ Pass ☐ Fail

Adjustments Required ☐ Fan Speed ☐ Damper

Equipment used : Thermo Anemometer Model 425 S/N : 03004786 Calibration date : 16/02/2023

3. HEPA filter leak test.

Measurement Data

HEPA Filter	PAO Upstream Conc.(calculated)	Specification	Measured leak penetration
Supply HEPA Filter	17 µg/L	<0.003%	<0.003%
Exhaust HEPA Filter	17 µg/L	<0.003%	<0.003%

Megafil Co., Ltd.

MG-FM-7.8-001, R00 (01/07/19)

Certificate No. : M1333/23

Leak location

Supply HEPA Filter
Back

Exhaust HEPA Filter
Back



Result Summary ☒ Pass ☐ Fail

Equipment used : Aerosol Photometer Model TDA-2H S/N : 21683 Calibration date : 16/02/2023

Equipment used : Smoke Generator Model TDA-6C S/N : 21623

4. Airflow smoke patterns test

Measurement Information

1. Downflow Pattern test : Smoke shall be passed from one end of the cabinet to the other, along the centerline of the work surface, at a height of 4 inch (10 cm) above the top of the access opening.
2. View screen retention test : Smoke shall be passed from one end of the cabinet to the other, 1.0 in (2.5 cm) behind the view screen, at a height 6.0 inch (15 cm) above the top of the access opening.
3. Work opening edge retention test : Smoke shall be passed along the entire perimeter of the work opening. Particular attention should be paid to corners and vertical edges.
4. Sash/window seal test : Smoke shall be passed up the inside of the window 2 in (5 cm) from the sides and along the top of the work area.

Certificate No. : M1333/23

Result Summary

Downflow Pattern test	<input checked="" type="checkbox"/> Accept	<input type="checkbox"/> Non-Conforming
View screen retention test	<input checked="" type="checkbox"/> Accept	<input type="checkbox"/> Non-Conforming
Work opening edge retention test	<input checked="" type="checkbox"/> Accept	<input type="checkbox"/> Non-Conforming
Sash/window seal test	<input checked="" type="checkbox"/> Accept	<input type="checkbox"/> Non-Conforming

5. Site installation

Sash Alarm.	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Interlock System.	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Exhaust System Performance	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A

Remark / Recommendation

7.1/1) Site installation ไม่มีการตรวจสอบ เนื่องจากตู้ไม่มีฟังก์ชันนี้

6. Illumination Test (Lighting) : Option

Lighting should be adequate for safe working within the cabinet. Illumination measured at the work surface.

Lux

609	959	932	557
861	1439	1486	765

Remark :

Certificate No. : M1333/23

7. Ultraviolet Lamp Test (UV) : Option

Ultraviolet radiation where UV Lamp are fitted, the intensity of radiation at a wavelength of 254 nm. Shall be not less than 400 mW/m² when measures at work floor surface.

mW/m²

690	1490	1520	720
440	960	970	430

Remark :

Certificate of Calibration

LIQUID BATH



Certificate No.: MC 2314268

Page 1 of 3

Customer : Water Analysis Center Co., Ltd.
1/94 Moo 5, T.Kantham, A.U.-Thai, Ayutthaya 13210.

Reference Job No. : 23-2833 Received Date : 15 December 2023

Description : Water Bath

Manufacturer : ESSTELL Model : EWB-122D

Serial No. : 20180508122 ID. No. : WWL 0214

Marking : Additionally for the purpose of identification by this laboratory a label marked with this certificate number (MC 2314268) has been attached to the case.

Method : In-House calibration procedure MWI-T-029 this method is reference to ASTM E715 "Liquid Bath".

Location of Calibration : Water Analysis Center Co., Ltd. ; Laboratory.

Environmental Condition : Ambient Temperature : (29.4 to 29.8) °C

Relative Humidity : (49.0 to 52.0) %

Date of Calibration : 15 December 2023 Date of Issue : 19 December 2023

Checked by : Chalermkit Rakphada
(Calibration Engineer)

Approved by : Aittipong Karanaesit
(Technical Manager)

The uncertainties are for a confidence probability of approximately 95%

This certificate is issued in accordance with the conditions of accreditation granted by the National Standardization Council of Thailand-Office of the National Standardization Council that has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of Master Calibration Co., Ltd.

Certificate No.: MC 2314268

Page 2 of 3

Reference Standard Instrument :

Description	Certificate No.	Serial No.	Due date	Traceable thru
Data Acquisition/Switch Unit	MC 2301270	MY44020009	9 Mar 2024	MCAL

With Thermocouple Type " T " ID. No.27/1 to 27/5

Traceability :

The measurement standard traceable to the international system of units (SI) through certificate as mentioned above

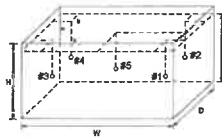
1. Calibration Procedure:

This Instrument was calibration according to ASTM E715 - 2007 by comparison with calibrated sensor under no load condition. The sensor were placed on five points and located one sensor in each of the eight corners of the chamber and was away from the each wall of 5 cm to 10 cm. And placed the five sensor within 2.5 cm of the geometric center of the chamber.

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. The reference sensor should preferably be located at the geometric center of the chamber.

Temperature Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

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



- Overall Ambient Temperature around the Chamber variation : 1.3 °C
- Overall Line Voltage variation : 0.0 V
- Chamber Size (W*H*D) : 50 cm x 12 cm x 30 cm
- Water Level : 7 cm

Checked by : Chalermkij

[MCF-Q-077 ; Rev.6 ; Date : 22/04/2021]

Certificate No.: MC 2314268

Page 3 of 3

2. Result of calibration :

Temperature Measurement Accuracy Test

Indicating Temperature (°C)	Measured Temperature (°C) at Spread Locations					Uncertainty (±°C)
	#1	#2	#3	#4	Ref. #5	
45.0	44.5	44.4	44.5	44.5	44.6	0.45

Chamber Characterization Result

Desired Temperature (°C)	Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
44.5	45.0	45.0	0.62	0.88	1.5

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.0$, providing a level of confidence of approximately 95 %.

This certificate will certify of the calibrated equipment only.

End of Certificate

Checked by : Chalermkij

[MCF-Q-077 ; Rev.6 ; Date : 22/04/2021]

Certificate of Calibration

**TEMPERATURE
CONTROLLER ENCLOSURES**



Certificate No.: MC 2314270

Page 1 of 3

Customer : Water Analysis Center Co., Ltd.
1/94 Moo 5, T.Kanphan, A.U-Thai, Ayutthaya 13210.

Reference Job No. : 23-2833 Received Date : 15 December 2023
Description : Incubator
Manufacturer : Memmert Model : IN260
Serial No. : D619.0170 ID. No. : WWL 0192
Marking : Additionally for the purpose of identification by this laboratory a label marked with this certificate number (MC 2314270) has been attached to the case.
Method : In-House calibration procedure MWI-T-033 this method is reference to TLAS G-20 "Temperature Controlled Enclosures"
Location of Calibration : Water Analysis Center Co., Ltd. ; Laboratory.
Environmental Conditions : Ambient Temperature : (25.2 to 25.6) °C
Relative Humidity : (65.4 to 66.2) %
Date of Calibration : 15 December 2023 Date of Issue : 19 December 2023

Checked by : Chalermkij
Chalermkij Rakphada
(Calibration Engineer)

Approved by : Aittipong
Aittipong Kachanasasi
(Technical Manager)

The uncertainties are for a confidence probability of approximately 95%

This certificate is issued in accordance with the conditions of accreditation granted by the National Standardization Council of Thailand-Office of the National Standardization Council that has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of Master Calibration Co.,Ltd.

[MCF-Q-077 ; Rev.6 ; Date : 22/04/2021]

Certificate No.: MC 2314270

Page 2 of 3

Reference Standard Instrument :

Description	Certificate No.	Serial No.	Due date	Traceable thru
Data Acquisition/Switch Unit	MC 2214032	MY41029992	26 Dec 2023	MCAL

With Thermocouple Type " T " ID. No.31/1 to 31/9

Traceability :

The measurement standard traceable to the international system of units (SI) through certificate as mentioned above

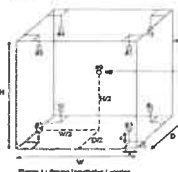
1. Calibration Procedure:

This Instrument was calibration according to TLAS G-20 by comparison with calibrated thermocouple type T under no load condition. The Thermocouples were placed on nine points and located one thermocouple in each of the eight corners of the chamber and was away from the each wall of 5 cm to 10 cm. And placed the ninth thermocouple within 2.5 cm of the geometric center of the chamber.

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. The reference sensor should preferably be located at the geometric center of the chamber.

Temperature Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

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



- Overall Ambient Temperature around the Chamber variation : 0.4 °C
- Overall Line Voltage variation : 0.0 V
- Chamber Size (W*H*D) : 65 cm x 80 cm x 50 cm

Checked by : Chalermkij

[MCF-Q-077 ; Rev.6 ; Date : 22/04/2021]

Certificate No.: MC 2314270

Page 3 of 3

2. Result of calibration :

Temperature Measurement Accuracy Test

Indicating Temperature (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (°C)
	#1	#2	#3	#4	#5	#6	#7	#8	Ref. #9	
35.0	35.2	35.2	35.2	35.2	35.1	35.1	35.0	35.1	35.1	0.44

Chamber Characterization Result

Desired Temperature (°C)	Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (°C)	Temperature Uniformity (°C)	Overall Variation (°C)
35.0	35.0	35.0	0.13	0.21	0.4

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 %.

This certificate will certify of the calibrated equipment only.

End of Certificate

Checked by : *Chalermit*

[MCP-Q-077 ; Rev.6 ; Date : 22/04/2021]

Certificate No.: MC 2314269

Page 2 of 3

Reference Standard Instrument :

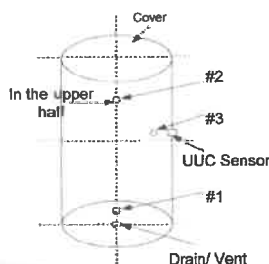
Description	Certificate No.	Serial No.	Due date	Traceable thru
Temperature Recorder RTD 100 Ohm	MC 2300163	M79252	9 Jan 2024	MCAL
Temperature Recorder RTD 100 Ohm	MC 2300164	5978194	9 Jan 2024	MCAL
Temperature Recorder RTD 100 Ohm	MC 2300165	M79251	9 Jan 2024	MCAL

Traceability :

The measurement standard traceable to the international system of units (SI) through certificate as mentioned above

1. Calibration Procedure:

The equipment list above was calibrated an accuracy of temperature in a chamber of the sterilizer.
The calibration was performed by direct measurement of generated temperatures using the standard thermometer with three temperature sensors. The data was recorded in a period of fifteen minutes of the sterilizing status. The temperature scale used was based on ITS-90.
The calibration of sterilizer was carried out at the point indicated by following the In-house calibration method No. MWI-T-036 based on BS 2646 : 1993 : Part 5 in Tests for performance section.



- Overall Line Voltage variation : 0.0 V

Checked by : *Chalermit*

[MCP-Q-077 ; Rev.6 ; Date : 22/04/2021]

Certificate of Calibration

AUTOCLAVE



Certificate No.: MC 2314269

Page 1 of 3



Customer : Water Analysis Center Co., Ltd.
1/94 Moo 5, T.Kantham, A.U.-Thai, Ayuthaya 13210.

Reference Job No. : 23-2833 Received Date : 15 December 2023
Description : Autoclave
Manufacturer : TOMY Model : Autoclave ES-315
Serial No. : 51135128 ID. No. : WWL 0083
Marking : Additionally for the purpose of identification by this laboratory a label marked with this certificate number (MC 2314269) has been attached to the case.
Method : In-House calibration procedure MWI-T-036 this method is reference to based on BS 2646 : 1993 Part 5 "Autoclave".
Location of Calibration : Water Analysis Center Co., Ltd. ; Laboratory.
Environmental Condition : Ambient Temperature : (29.4 to 30.7) °C
Relative Humidity : (50.0 to 52.0) %
Date of Calibration : 15 December 2023 Date of Issue : 19 December 2023

Checked by : *Chalermit*
Chalermit Rakphada
(Calibration Engineer)

Approved by : *Aittipong*
Aittipong Kanjanasit
(Technical Manager)

The uncertainties are for a confidence probability of approximately 95%

This certificate is issued in accordance with the conditions of accreditation granted by the National Standardization Council of Thailand-Office of the National Standardization Council that has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of Master Calibration Co.,Ltd.

[MCP-Q-077 ; Rev.6 ; Date : 22/04/2021]

Certificate No.: MC 2314269

Page 3 of 3

2. Result of calibration :

Temperature Measurement Accuracy Test

Indicating Temperature (°C)	Measured Temperature (°C) at Spread Locations			Uncertainty (°C)
	#1	#2	#3	
121	121.72	121.73	121.95	0.61

Characterization Result

Desired Temperature (°C)	Setting Temperature (°C)	Timer Setting (min)	Indicating Temperature (°C)	Indicating Pressure (kPa)	Measured Stability (°C)	Measured Uniformity (°C)	Overall Variation (°C)
121	121	15.0	121	120	0.60	0.35	1.35

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 %.

This certificate will certify of the calibrated equipment only.

End of Certificate

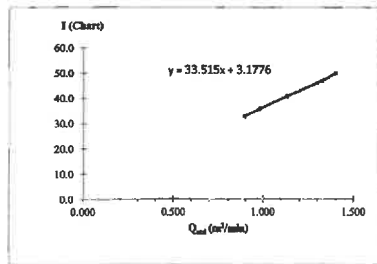
Checked by : *Chalermit*

[MCP-Q-077 ; Rev.6 ; Date : 22/04/2021]

High Volume Air Sampler Calibration Worksheet

Project Site : ส่วนอุตสาหกรรมโรงงานสุรา
Location : บ้านนาหนาด
Date of measurement : 4/3/2024
Worksheet No. : C-848324-WWL0093 Calibration Office :
High Volume ID : WWL0093 Calibrator ID : WWL0103
High Volume Model : TE-5170 (TSP) Calibrator Model : TE-5028A
High Volume S/N : 2729 Calibrator S/N : 3271
Ambient Condition : Calibrate Date : 13/03/2023
Temperature (°C) : 26 Quality Standard Slope : 1.59945
Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01874

Test No.	delta H ₂ O (inch)	Q _{as} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	4.90	1.390	50.0	49.80	Slope : 33.38 Intercept : 3.165 Correlation Coefficient : 0.9995
2	4.40	1.318	47.0	46.81	
3	3.20	1.126	41.0	40.83	
4	2.40	0.976	36.0	35.85	
5	2.00	0.892	33.0	32.87	

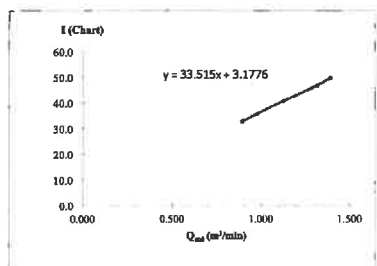


Calibrated by : Mr. JITTAWEE WONGMAKHEB
Chemist
Approved by : Mr. RUNGSASIKORN KOSUM
Technical Management
บันทึกข้อมูล : วันที่บันทึกข้อมูล : 1 ธ.ค. 2566 หน้า : 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : ส่วนอุตสาหกรรมโรงงานสุรา
Location : บ้านนาหนาด
Date of measurement : 4/3/2023
Worksheet No. : C-848324-WWL0094 Calibration Office :
High Volume ID : WWL0094 Calibrator ID : WWL0103
High Volume Model : TE-5170 (TSP) Calibrator Model : TE-5028A
High Volume S/N : 2736 Calibrator S/N : 3271
Ambient Condition : Calibrate Date : 13/03/2023
Temperature (°C) : 26 Quality Standard Slope : 1.59945
Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01874

Test No.	delta H ₂ O (inch)	Q _{as} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	4.90	1.390	50.0	49.80	Slope : 33.38 Intercept : 3.165 Correlation Coefficient : 0.9995
2	4.40	1.318	47.0	46.81	
3	3.20	1.126	41.0	40.83	
4	2.40	0.976	36.0	35.85	
5	2.00	0.892	33.0	32.87	

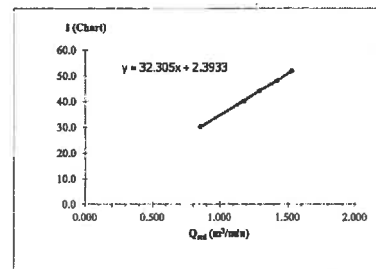


Calibrated by : Mr. JITTAWEE WONGMAKHEB
Chemist
Approved by : Mr. RUNGSASIKORN KOSUM
Technical Management
บันทึกข้อมูล : วันที่บันทึกข้อมูล : 1 ธ.ค. 2566 หน้า : 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : ส่วนอุตสาหกรรมโรงงานสุรา
Location : บ้านนาหนาด
Date of measurement : 4/3/2024
Worksheet No. : C-848324-WWL0096 Calibration Office :
High Volume ID : WWL0096 Calibrator ID : WWL0103
High Volume Model : TE-5170 (TSP) Calibrator Model : TE-5028A
High Volume S/N : 2730 Calibrator S/N : 3271
Ambient Condition : Calibrate Date : 13/03/2023
Temperature (°C) : 26 Quality Standard Slope : 1.59945
Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01874

Test No.	delta H ₂ O (inch)	Q _{as} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.90	1.524	52.0	51.79	Slope : 32.18 Intercept : 2.384 Correlation Coefficient : 0.9995
2	5.10	1.418	48.0	47.81	
3	4.20	1.288	44.0	43.82	
4	3.50	1.177	40.0	39.84	
5	1.80	0.847	30.0	29.88	

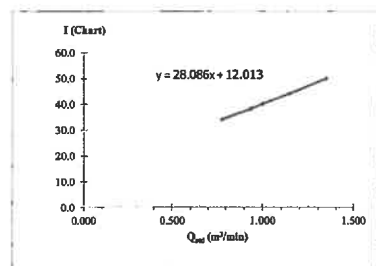


Calibrated by : Mr. JITTAWEE WONGMAKHEB
Chemist
Approved by : Mr. RUNGSASIKORN KOSUM
Technical Management
บันทึกข้อมูล : วันที่บันทึกข้อมูล : 1 ธ.ค. 2566 หน้า : 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : ส่วนอุตสาหกรรมโรงงานสุรา
Location : บ้านนาหนาด
Date of measurement : 4/3/2024
Worksheet No. : C-848324-WWL0097 Calibration Office :
High Volume ID : WWL0097 Calibrator ID : WWL0103
High Volume Model : TE-5170 (TSP) Calibrator Model : TE-5028A
High Volume S/N : 2726 Calibrator S/N : 3271
Ambient Condition : Calibrate Date : 13/03/2023
Temperature (°C) : 26 Quality Standard Slope : 1.59945
Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01874

Test No.	delta H ₂ O (inch)	Q _{as} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	4.60	1.347	50.0	49.80	Slope : 27.97 Intercept : 11.964 Correlation Coefficient : 0.9994
2	3.30	1.143	44.0	43.82	
3	2.50	0.996	40.0	39.84	
4	2.20	0.935	36.0	37.85	
5	1.50	0.774	34.0	33.86	

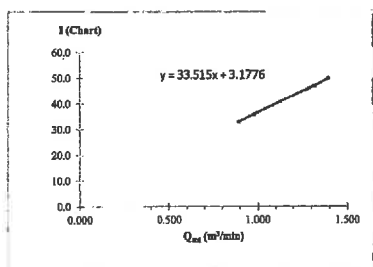


Calibrated by : Mr. JITTAWEE WONGMAKHEB
Chemist
Approved by : Mr. RUNGSASIKORN KOSUM
Technical Management
บันทึกข้อมูล : วันที่บันทึกข้อมูล : 1 ธ.ค. 2566 หน้า : 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอยุธยา Page 1 of 1
 Location : บ้านนาหน
 Date of measurement : 4/3/2024
 Worksheet No. : C-448324-WWL0095 Calibration Office : WWL0103
 High Volume ID : WWL0095 Calibrator ID : TE-5028A
 High Volume Model : TE-5170 (TSP) Calibrator Model : 3271
 High Volume S/N : 2727 Calibrator S/N : 13/03/2023
 Ambient Condition : 159945
 Temperature (°C) : 26 Quality Standard Slope : -0.01874
 Barometric Pressure (mmHg) : 756 Quality Standard Intercept :

Test No.	delta H ₂ O (inch)	Q _{as} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	4.90	1.390	50.0	49.80	Slope: 33.38 Intercept: 3.165 Correlation Coefficient: 0.9995
2	4.40	1.318	47.0	46.81	
3	3.20	1.126	41.0	40.83	
4	2.40	0.976	36.0	35.85	
5	2.00	0.892	33.0	32.87	

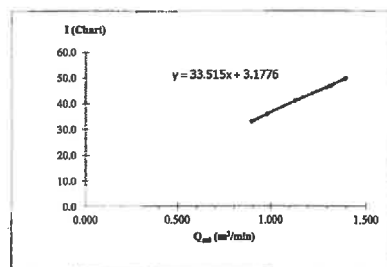


Calibrated by : Mr. JITTAWEE WONGMAKHIEB Approved by : Mr. RUNGRASIKORN KOSUM
 Chemist Technical Manager
 POLAB 55-1/25 แก้ไขครั้งที่: 1 วันที่แก้ไข: 1 พ.ค. 2560 หน้า: 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอยุธยา Page 1 of 1
 Location : บ้านนาหน
 Date of measurement : 4/3/2024
 Worksheet No. : C-448324-WWL0223 Calibration Office : WWL0103
 High Volume ID : WWL0223 Calibrator ID : TE-5028A
 High Volume Model : TE-5170 (TSP) Calibrator Model : 3271
 High Volume S/N : 2738 Calibrator S/N : 13/03/2024
 Ambient Condition : 159945
 Temperature (°C) : 26 Quality Standard Slope : -0.01874
 Barometric Pressure (mmHg) : 756 Quality Standard Intercept :

Test No.	delta H ₂ O (inch)	Q _{as} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	4.90	1.390	50.0	49.80	Slope: 33.38 Intercept: 3.165 Correlation Coefficient: 0.9995
2	4.40	1.318	47.0	46.81	
3	3.20	1.126	41.0	40.83	
4	2.40	0.976	36.0	35.85	
5	2.00	0.892	33.0	32.87	

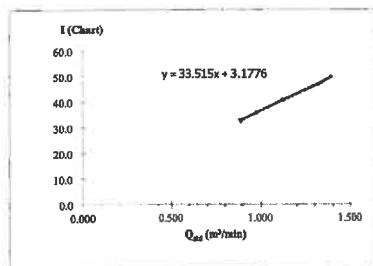


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 Chemist Technical Manager
 POLAB 55-1/25 แก้ไขครั้งที่: 1 วันที่แก้ไข: 1 พ.ค. 2560 หน้า: 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอยุธยา Page 1 of 1
 Location : บ้านนาหน
 Date of measurement : 5/12/2023
 Worksheet No. : C-448324-TSPR1 Calibration Office : WWL0103
 High Volume ID : TSPNO.1 Calibrator ID : TE-5028A
 High Volume Model : TE-5170 (TSP) Calibrator Model : 3271
 High Volume S/N : 13/03/2024
 Ambient Condition : 159945
 Temperature (°C) : 26 Quality Standard Slope : -0.01874
 Barometric Pressure (mmHg) : 756 Quality Standard Intercept :

Test No.	delta H ₂ O (inch)	Q _{as} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	4.90	1.390	50.0	49.80	Slope: 33.38 Intercept: 3.165 Correlation Coefficient: 0.9995
2	4.40	1.318	47.0	46.81	
3	3.20	1.126	41.0	40.83	
4	2.40	0.976	36.0	35.85	
5	2.00	0.892	33.0	32.87	

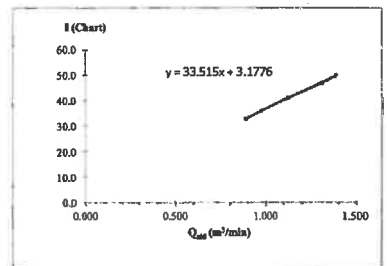


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 Chemist Technical Manager
 POLAB 55-1/25 แก้ไขครั้งที่: 1 วันที่แก้ไข: 1 พ.ค. 2560 หน้า: 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอยุธยา Page 1 of 1
 Location : บ้านนาหน
 Date of measurement : 5/12/2023
 Worksheet No. : C-451123-TSPR2 Calibration Office : WWL0103
 High Volume ID : TSPNO.2 Calibrator ID : TE-5028A
 High Volume Model : TE-5170 (TSP) Calibrator Model : 3271
 High Volume S/N : 13/03/2024
 Ambient Condition : 159945
 Temperature (°C) : 26 Quality Standard Slope : -0.01874
 Barometric Pressure (mmHg) : 756 Quality Standard Intercept :

Test No.	delta H ₂ O (inch)	Q _{as} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	4.90	1.390	50.0	49.80	Slope: 33.38 Intercept: 3.165 Correlation Coefficient: 0.9995
2	4.40	1.318	47.0	46.81	
3	3.20	1.126	41.0	40.83	
4	2.40	0.976	36.0	35.85	
5	2.00	0.892	33.0	32.87	

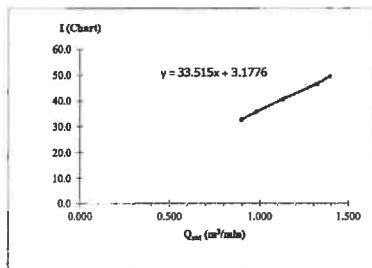


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 Chemist Technical Manager
 POLAB 55-1/25 แก้ไขครั้งที่: 1 วันที่แก้ไข: 1 พ.ค. 2560 หน้า: 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอยุธยา Page 1 of 1
 Location : บ้านนาเหนือ
 Date of measurement : 4/3/2024
 Worksheet No. : C-040324-TSPR3 Calibration Office
 High Volume ID : TSPNO.6 Calibrator ID : WWL0103
 High Volume Model : TE-5170 (TSP) Calibrator Model : TE-5028A
 High Volume S/N : 3271 Calibrator S/N : 3271
 Ambient Condition : 13/03/2024 Calibrator Date : 13/03/2023
 Temperature (°C) : 26 Quality Standard Slope : 1.59945
 Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01874

Test No.	delta H ₂ O (inch)	Q _{std} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	4.90	1.390	50.0	49.80	Slope : 33.38 Intercept : 3.165 Correlation Coefficient : 0.9995
2	4.40	1.318	47.0	46.81	
3	3.20	1.126	41.0	40.83	
4	2.40	0.976	36.0	35.85	
5	2.00	0.892	33.0	32.87	

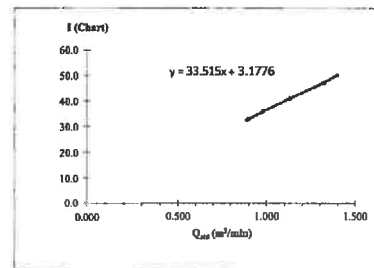


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 POLAB 5.5-1/25 วันที่ใช้ : วันจันทร์ที่ 11 เดือน มี.ค. 2568 หน้า : 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอยุธยา Page 1 of 1
 Location : บ้านนาเหนือ
 Date of measurement : 4/3/2024
 Worksheet No. : C-040324-TSPR4 Calibration Office
 High Volume ID : TSPNO.3 Calibrator ID : WWL0103
 High Volume Model : TE-5170 (TSP) Calibrator Model : TE-5028A
 High Volume S/N : 3271 Calibrator S/N : 3271
 Ambient Condition : 13/03/2023 Calibrator Date : 13/03/2023
 Temperature (°C) : 26 Quality Standard Slope : 1.59945
 Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01874

Test No.	delta H ₂ O (inch)	Q _{std} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	4.90	1.390	50.0	49.80	Slope : 33.38 Intercept : 3.165 Correlation Coefficient : 0.9995
2	4.40	1.318	47.0	46.81	
3	3.20	1.126	41.0	40.83	
4	2.40	0.976	36.0	35.85	
5	2.00	0.892	33.0	32.87	

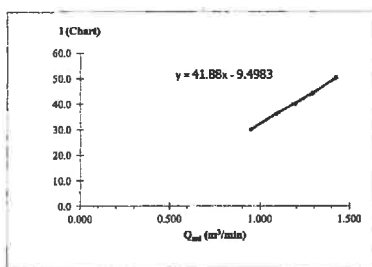


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 POLAB 5.5-1/25 วันที่ใช้ : วันจันทร์ที่ 11 เดือน มี.ค. 2568 หน้า : 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอยุธยา Page 1 of 1
 Location : บ้านนาเหนือ
 Date of measurement : 4/3/2024
 Worksheet No. : C-040324-WWL0098 Calibration Office
 High Volume ID : WWL0098 Calibrator ID : WWL0103
 High Volume Model : TE-6070 (PM10) Calibrator Model : TE-5028A
 High Volume S/N : 2734 Calibrator S/N : 3271
 Ambient Condition : 13/03/2023 Calibrator Date : 13/03/2023
 Temperature (°C) : 26 Quality Standard Slope : 1.00155
 Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01185

Test No.	delta H ₂ O (inch)	Q _{std} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.00	1.416	50.0	31.44	Slope : 26.34 Intercept : -5.975 Correlation Coefficient : 0.9996
2	4.10	1.283	44.0	27.67	
3	3.50	1.186	40.0	25.15	
4	2.90	1.081	36.0	22.64	
5	2.20	0.943	30.0	18.87	

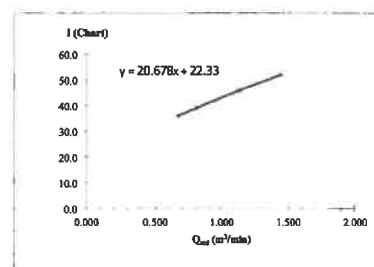


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 Chemist Technical Management
 POLAB 5.5-1/25 วันที่ใช้ : วันจันทร์ที่ 11 เดือน มี.ค. 2568 หน้า : 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอยุธยา Page 1 of 1
 Location : บ้านนาเหนือ
 Date of measurement : 4/3/2024
 Worksheet No. : C-040324-WWL0101 Calibration Office
 High Volume ID : WWL0101 Calibrator ID : WWL0103
 High Volume Model : TE-6070 (PM10) Calibrator Model : TE-5028A
 High Volume S/N : 2733 Calibrator S/N : 3271
 Ambient Condition : 13/03/2023 Calibrator Date : 13/03/2023
 Temperature (°C) : 26 Quality Standard Slope : 1.00155
 Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01185

Test No.	delta H ₂ O (inch)	Q _{std} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.20	1.444	52.0	32.70	Slope : 13.00 Intercept : 14.042 Correlation Coefficient : 0.9996
2	3.20	1.135	46.0	28.93	
3	2.20	0.943	42.0	26.41	
4	1.60	0.806	39.0	24.52	
5	1.10	0.570	36.0	22.64	

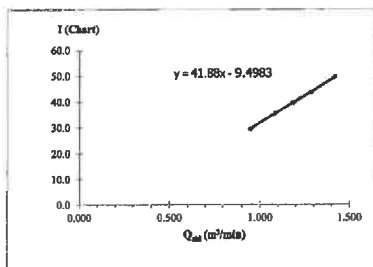


Calibrated by : Mr. JITTAWEE WONGMAKHEB Approved by : Mr. RUNGASAKORN KOSUM
 Chemist Technical Management
 POLAB 5.5-1/25 วันที่ใช้ : วันจันทร์ที่ 11 เดือน มี.ค. 2568 หน้า : 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : งานอุตสาหกรรมโรงงาน Page 1 of 1
 Location : บ้านนาเหนือ
 Date of measurement : 4/3/2023
 Worksheet No. : C-040324-WWL0099 Calibration Office
 High Volume ID : WWL0099 Calibrator ID : WWL0103
 High Volume Model : TE-6070 (PM10) Calibrator Model : TE-5028A
 High Volume S/N : 2734 Calibrator S/N : 3271
 Ambient Condition : 13/03/2023
 Temperature (°C) : 26 Quality Standard Slope : 1.00155
 Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01185

Test No.	delta H ₂ O (inch)	Q _{as} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.00	1.416	50.0	31.44	Slope : 26.34 Intercept : -5.973 Correlation Coefficient : 0.9996
2	4.10	1.283	44.0	27.67	
3	3.50	1.186	40.0	25.15	
4	2.90	1.081	36.0	22.64	
5	2.20	0.943	30.0	18.87	

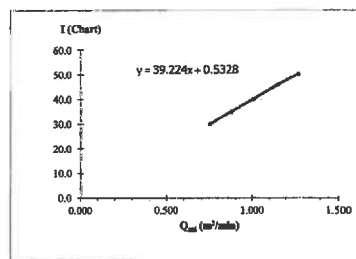


Calibrated by : [Signature] Approved by : [Signature]
 Mr. JITTAWEE WONGMAKHEB Mr. RUNGSASIKORN KOSUM
 Chemist Technical Manager
 POLAB 5.5-1/25 แก้ไขครั้งที่ : วันที่ส่งไฟล์ : 1 เม.ย. 2560 หน้า : 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : งานอุตสาหกรรมโรงงาน Page 1 of 1
 Location : บ้านนาเหนือ
 Date of measurement : 4/3/2024
 Worksheet No. : C-051223-WWL0102 Calibration Office
 High Volume ID : WWL0102 Calibrator ID : WWL0103
 High Volume Model : TE-6070 (PM10) Calibrator Model : TE-5028A
 High Volume S/N : 2731 Calibrator S/N : 3271
 Ambient Condition : 13/03/2023
 Temperature (°C) : 26 Quality Standard Slope : 1.00155
 Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01185

Test No.	delta H ₂ O (inch)	Q _{as} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	4.00	1.268	50.0	31.44	Slope : 24.67 Intercept : 0.335 Correlation Coefficient : 0.9997
2	3.30	1.152	46.0	28.93	
3	2.50	1.005	40.0	25.15	
4	1.90	0.877	35.0	22.01	
5	1.40	0.755	30.0	18.87	

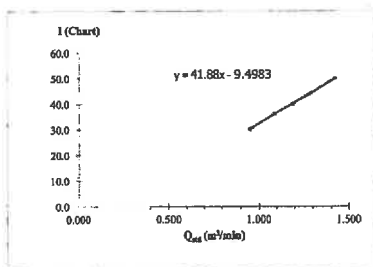


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 Mr. JITTAWEE WONGMAKHEB Mr. RUNGSASIKORN KOSUM
 Chemist Technical Manager
 POLAB 5.5-1/25 แก้ไขครั้งที่ : วันที่ส่งไฟล์ : 1 เม.ย. 2560 หน้า : 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : งานอุตสาหกรรมโรงงาน Page 1 of 1
 Location : บ้านนาเหนือ
 Date of measurement : 4/3/2024
 Worksheet No. : C-040324-WWL0100 Calibration Office
 High Volume ID : WWL0100 Calibrator ID : WWL0103
 High Volume Model : TE-6070 (PM10) Calibrator Model : TE-5028A
 High Volume S/N : 2735 Calibrator S/N : 3271
 Ambient Condition : 13/03/2023
 Temperature (°C) : 26 Quality Standard Slope : 1.00155
 Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01185

Test No.	delta H ₂ O (inch)	Q _{as} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.00	1.416	50.0	31.44	Slope : 26.34 Intercept : -5.973 Correlation Coefficient : 0.9996
2	4.10	1.283	44.0	27.67	
3	3.50	1.186	40.0	25.15	
4	2.90	1.081	36.0	22.64	
5	2.20	0.943	30.0	18.87	

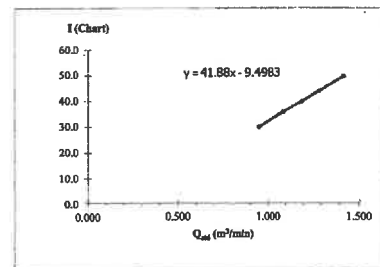


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 Mr. JITTAWEE WONGMAKHEB Mr. RUNGSASIKORN KOSUM
 Chemist Technical Manager
 POLAB 5.5-1/25 แก้ไขครั้งที่ : วันที่ส่งไฟล์ : 1 เม.ย. 2560 หน้า : 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : งานอุตสาหกรรมโรงงาน Page 1 of 1
 Location : บ้านนาเหนือ
 Date of measurement : 4/3/2024
 Worksheet No. : C-040324-WWL0224 Calibration Office
 High Volume ID : WWL0224 Calibrator ID : WWL0103
 High Volume Model : TE-6070 (PM10) Calibrator Model : TE-5028A
 High Volume S/N : 2739 Calibrator S/N : 3271
 Ambient Condition : 13/03/2022
 Temperature (°C) : 26 Quality Standard Slope : 1.00155
 Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01185

Test No.	delta H ₂ O (inch)	Q _{as} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.00	1.416	50.0	31.44	Slope : 26.34 Intercept : -5.973 Correlation Coefficient : 0.9996
2	4.10	1.283	44.0	27.67	
3	3.50	1.186	40.0	25.15	
4	2.90	1.081	36.0	22.64	
5	2.20	0.943	30.0	18.87	

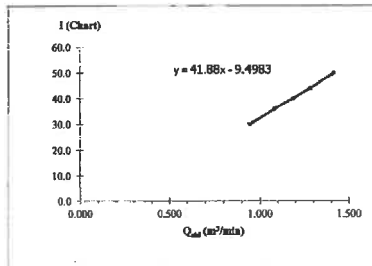


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 Mr. JITTAWEE WONGMAKHEB Mr. RUNGSASIKORN KOSUM
 Chemist Technical Manager
 POLAB 5.5-1/25 แก้ไขครั้งที่ : วันที่ส่งไฟล์ : 1 เม.ย. 2560 หน้า : 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอุดร Page 1 of 1
Location : บ้านนาบึง
Date of measurement : 4/3/2024
Worksheet No. : C-040324-PM10R1 Calibration Office
High Volume ID : PM10NO.1 Calibrator ID : WWL0103
High Volume Model : TE-6070 (PM10) Calibrator Model : TE-S028A
High Volume S/N : 3271 Calibrator S/N :
Ambient Condition : 13/03/2024 Calibrate Date :
Temperature (°C) : 26 Quality Standard Slope : 1.00155
Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01185

Test No.	delta H ₂ O (inch)	Q _{std} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.00	1.416	50.0	31.44	Slope : 26.34 Intercept : -5.973 Correlation Coefficient : 0.9996
2	4.10	1.283	44.0	27.67	
3	3.50	1.186	40.0	25.15	
4	2.90	1.081	36.0	22.64	
5	2.20	0.943	30.0	18.87	

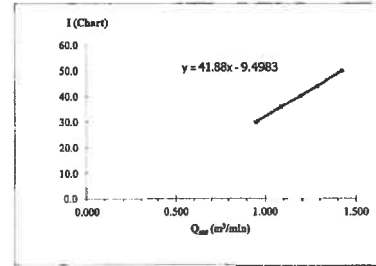


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Mr. JITTAWEE WONGMAKHEB Mr. RUNGASIKORN KOSUM
POLAB 3.5-1025 วันที่สอบ : วันที่สอบ : 13.03.2560 หน้า : 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอุดร Page 1 of 1
Location : บ้านนาบึง
Date of measurement : 5/12/2023
Worksheet No. : C-051223-PM10R2 Calibration Office
High Volume ID : PM10NO.2 Calibrator ID : WWL0103
High Volume Model : TE-6070 (PM10) Calibrator Model : TE-S028A
High Volume S/N : 3271 Calibrator S/N :
Ambient Condition : 13/03/2024 Calibrate Date :
Temperature (°C) : 26 Quality Standard Slope : 1.00155
Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01185

Test No.	delta H ₂ O (inch)	Q _{std} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.00	1.416	50.0	31.44	Slope : 26.34 Intercept : -5.973 Correlation Coefficient : 0.9996
2	4.10	1.283	44.0	27.67	
3	3.50	1.186	40.0	25.15	
4	2.90	1.081	36.0	22.64	
5	2.20	0.943	30.0	18.87	

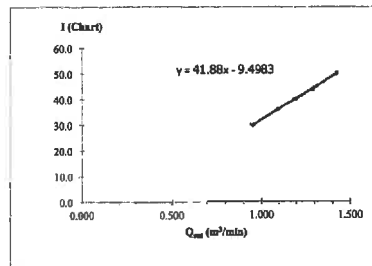


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Mr. JITTAWEE WONGMAKHEB Mr. RUNGASIKORN KOSUM
POLAB 3.5-1025 วันที่สอบ : วันที่สอบ : 13.03.2560 หน้า : 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอุดร Page 1 of 1
Location : บ้านนาบึง
Date of measurement : 4/3/2024
Worksheet No. : C-040324-PM10R3 Calibration Office
High Volume ID : PM10NO.6 Calibrator ID : WWL0103
High Volume Model : TE-6070 (PM10) Calibrator Model : TE-S028A
High Volume S/N : 3271 Calibrator S/N :
Ambient Condition : 13/03/2024 Calibrate Date :
Temperature (°C) : 26 Quality Standard Slope : 1.00155
Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01185

Test No.	delta H ₂ O (inch)	Q _{std} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.00	1.416	50.0	31.44	Slope : 26.34 Intercept : -5.973 Correlation Coefficient : 0.9996
2	4.10	1.283	44.0	27.67	
3	3.50	1.186	40.0	25.15	
4	2.90	1.081	36.0	22.64	
5	2.20	0.943	30.0	18.87	

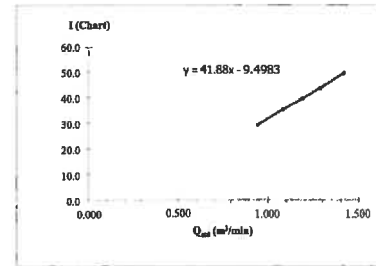


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Mr. JITTAWEE WONGMAKHEB Mr. RUNGASIKORN KOSUM
POLAB 3.5-1025 วันที่สอบ : วันที่สอบ : 13.03.2560 หน้า : 1 ของ 1

High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอุดร Page 1 of 1
Location : บ้านนาบึง
Date of measurement : 4/3/2024
Worksheet No. : C-040324-PM10R4 Calibration Office
High Volume ID : PM10NO.5 Calibrator ID : WWL0103
High Volume Model : TE-6070 (PM10) Calibrator Model : TE-S028A
High Volume S/N : 3271 Calibrator S/N :
Ambient Condition : 13/03/2023 Calibrate Date :
Temperature (°C) : 26 Quality Standard Slope : 1.00155
Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01185

Test No.	delta H ₂ O (inch)	Q _{std} (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.00	1.416	50.0	31.44	Slope : 26.34 Intercept : -5.973 Correlation Coefficient : 0.9996
2	4.10	1.283	44.0	27.67	
3	3.50	1.186	40.0	25.15	
4	2.90	1.081	36.0	22.64	
5	2.20	0.943	30.0	18.87	



Calibrated by : [Signature] Approved by : [Signature]
Mr. JITTAWEE WONGMAKHEB Mr. RUNGASIKORN KOSUM
POLAB 3.5-1025 วันที่สอบ : วันที่สอบ : 13.03.2560 หน้า : 1 ของ 1



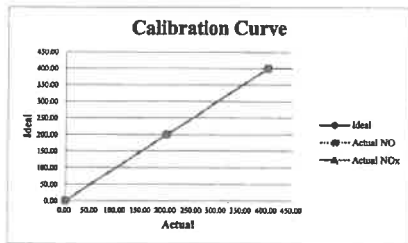
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194 Moo 5, T.Bangna Phadung, A-U-Thai, Ayutthaya 12110, Thailand
Tel: 0-35226-383, 0-35800-993 Fax: 0-35800-994

Nitrogen Dioxide Analyzer Calibration Worksheet

Project Site : ต.บางนาผดุง อ.สุขุมวิท จ.สมุทรปราการ
Location : ต.บางนาผดุง
Date of measurement : 04 March 2024
Worksheet No. : C-040324-WWL 0114
Ambient NO_x Analyzer ID : WWL 0114
Manufacturer : HORIBA
Ambient NO_x Analyzer Model : AFNA-370
Ambient NO_x Analyzer S/N : PIE9955

Multi Gas Calibrator
Calibrator ID : WWL0128
Calibrator Model : Series 6100
Calibrator S/N : S/N 7462
Calibrate Date : 10 January 2023
Cylinder Std. Gas
Std. Gas Concentration (PPM) : 50.90
Cylinder Pressure (psi) : 2000
Certified Date : 07 December 2021
Expired Date : 07 December 2025
Serial No. : CC241587

Point	CALIBRATION RESULTS						
	Ideal	Actual NO	Error NO	%Error NO	Actual NO _x	Error NO _x	%Error NO _x
ZERO	0.00	0.10	0.10	-	0.00	0.00	-
SPAN 200 ppb	200.00	200.10	0.10	0.05	200.10	0.10	0.05
SPAN 400 ppb	400.00	400.10	0.10	0.03	400.20	0.20	0.05
AVERAGE (%)				0.04			0.05



Calibrated by : (Miss SUTHIDA SINGHAPHEN)
Checker

Approved by : (Mr. RUNGSASIKORN KOSUM)
Technical Management



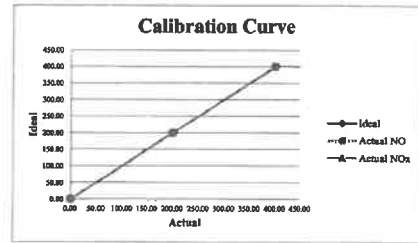
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Tel: 0-35226-383, 0-35800-993 Fax: 0-35800-994

Nitrogen Dioxide Analyzer Calibration Worksheet

Project Site : ต.บางนาผดุง อ.สุขุมวิท จ.สมุทรปราการ
Location : ต.บางนาผดุง
Date of measurement : 04 March 2024
Worksheet No. : C-040324-WWL 0115
Ambient NO_x Analyzer ID : WWL 0115
Manufacturer : HORIBA
Ambient NO_x Analyzer Model : AFNA-370
Ambient NO_x Analyzer S/N : 705KA91J

Multi Gas Calibrator
Calibrator ID : WWL0128
Calibrator Model : Series 6100
Calibrator S/N : S/N 7462
Calibrate Date : 10 January 2023
Cylinder Std. Gas
Std. Gas Concentration (PPM) : 50.90
Cylinder Pressure (psi) : 2000
Certified Date : 07 December 2021
Expired Date : 07 December 2025
Serial No. : CC241587

Point	CALIBRATION RESULTS						
	Ideal	Actual NO	Error NO	%Error NO	Actual NO _x	Error NO _x	%Error NO _x
ZERO	0.00	0.10	0.10	-	0.10	0.10	-
SPAN 200 ppb	200.00	200.10	0.10	0.05	200.10	0.10	0.05
SPAN 400 ppb	400.00	400.10	0.10	0.03	400.20	0.20	0.05
AVERAGE (%)				0.04			0.05



Calibrated by : (Miss SUTHIDA SINGHAPHEN)
Checker

Approved by : (Mr. RUNGSASIKORN KOSUM)
Technical Management



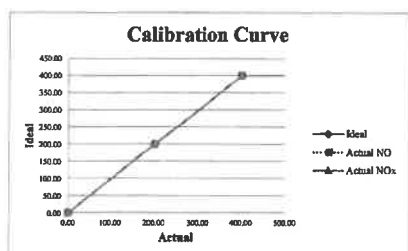
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Tel: 0-35226-383, 0-35800-993 Fax: 0-35800-994

Nitrogen Dioxide Analyzer Calibration Worksheet

Project Site : ต.บางนาผดุง อ.สุขุมวิท จ.สมุทรปราการ
Location : ต.บางนาผดุง
Date of measurement : 04 March 2024
Worksheet No. : C-040324-WWL 0116
Ambient NO_x Analyzer ID : WWL 0116
Manufacturer : HORIBA
Ambient NO_x Analyzer Model : AFNA-370
Ambient NO_x Analyzer S/N : 09BKGTUK

Multi Gas Calibrator
Calibrator ID : WWL0128
Calibrator Model : Series 6100
Calibrator S/N : S/N 7462
Calibrate Date : 10 January 2023
Cylinder Std. Gas
Std. Gas Concentration (PPM) : 50.90
Cylinder Pressure (psi) : 2000
Certified Date : 07 December 2021
Expired Date : 07 December 2025
Serial No. : CC241587

Point	CALIBRATION RESULTS						
	Ideal	Actual NO	Error NO	%Error NO	Actual NO _x	Error NO _x	%Error NO _x
ZERO	0.00	0.10	0.10	-	0.00	0.00	-
SPAN 200 ppb	200.00	200.10	0.10	0.05	200.20	0.20	0.10
SPAN 400 ppb	400.00	400.20	0.20	0.05	400.10	0.10	0.03
AVERAGE (%)				0.05			0.06



Calibrated by : (Miss SUTHIDA SINGHAPHEN)
Checker

Approved by : (Mr. RUNGSASIKORN KOSUM)
Technical Management



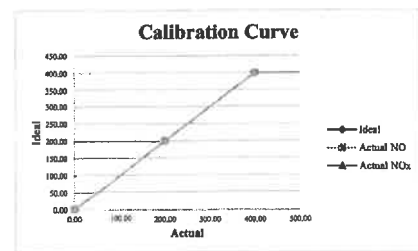
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Tel: 0-35226-383, 0-35800-993 Fax: 0-35800-994

Nitrogen Dioxide Analyzer Calibration Worksheet

Project Site : ต.บางนาผดุง อ.สุขุมวิท จ.สมุทรปราการ
Location : ต.บางนาผดุง
Date of measurement : 04 March 2024
Worksheet No. : C-040324-WWL 0022
Ambient NO_x Analyzer ID : WWL 0022
Manufacturer : Thermo Environmental Instruments Inc
Ambient NO_x Analyzer Model : 43C
Ambient NO_x Analyzer S/N : 42C-70988-367

Multi Gas Calibrator
Calibrator ID : WWL0128
Calibrator Model : Series 6100
Calibrator S/N : S/N 7462
Calibrate Date : 10 January 2023
Cylinder Std. Gas
Std. Gas Concentration (PPM) : 50.90
Cylinder Pressure (psi) : 2000
Certified Date : 07 December 2021
Expired Date : 07 December 2025
Serial No. : CC241587

Point	CALIBRATION RESULTS						
	Ideal	Actual NO	Error NO	%Error NO	Actual NO _x	Error NO _x	%Error NO _x
ZERO	0.00	0.10	0.10	-	0.00	0.00	-
SPAN 200 ppb	200.00	200.10	0.10	0.05	200.20	0.20	0.10
SPAN 400 ppb	400.00	400.10	0.10	0.03	400.10	0.10	0.03
AVERAGE (%)				0.04			0.06



Calibrated by : (Miss SUTHIDA SINGHAPHEN)
Checker

Approved by : (Mr. RUNGSASIKORN KOSUM)
Technical Management

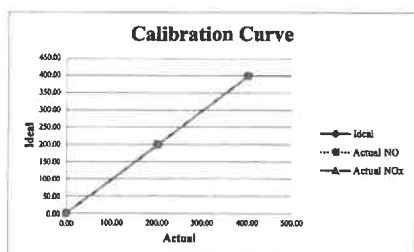
Nitrogen Dioxide Analyzer Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะ อุตสาหกรรม
Location : วัดโสมนัส
Date of measurement : 04 March 2024
Worksheet No. : C-040324-WWL 0118
Ambient NOx Analyzer ID : WWL 0118
Manufacturer : HORIBA
Ambient NOx Analyzer Model : APNA-370
Ambient NOx Analyzer S/N : W2VNUX08

Multi Gas Calibrator
Calibrator ID : WWL0128
Calibrator Model : Series 6100
Calibrator S/N : S/N 7462
Calibrate Date : 10 January 2023

Cylinder Std. Gas
Std. Gas Concentration (PPM) : 50.90
Cylinder Pressure (psi) : 2000
Certified Date : 07 December 2021
Expired Date : 07 December 2025
Serial No. : CC41587

Point	CALIBRATION RESULTS						
	Ideal	Actual NO	Error NO	%Error NO	Actual NO _x	Error NO _x	%Error NO _x
ZERO	0.00	0.10	0.10	-	0.20	0.20	-
SPAN 200 ppb	200.00	200.20	0.20	0.10	200.10	0.10	0.05
SPAN 400 ppb	400.00	400.10	0.10	0.03	400.10	0.10	0.03
AVERAGE (%)				0.06			0.04



Calibrated by : (Miss SUTHIDA SINGHAPHEN)
Client

Approved by : (Mr. RUNGASIKORN KOSUM)
Technical Manager

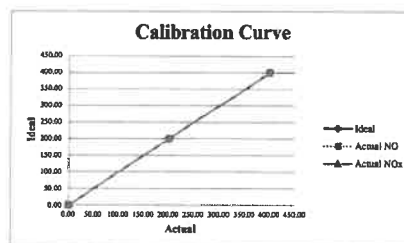
Nitrogen Dioxide Analyzer Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะ อุตสาหกรรม
Location : วัดโสมนัส
Date of measurement : 04 March 2024
Worksheet No. : C-040324-WWL 0117
Ambient NOx Analyzer ID : WWL 0117
Manufacturer : HORIBA
Ambient NOx Analyzer Model : APNA-370
Ambient NOx Analyzer S/N : VKLYC3K0

Multi Gas Calibrator
Calibrator ID : WWL0128
Calibrator Model : Series 6100
Calibrator S/N : S/N 7462
Calibrate Date : 10 January 2023

Cylinder Std. Gas
Std. Gas Concentration (PPM) : 50.90
Cylinder Pressure (psi) : 2000
Certified Date : 07 December 2021
Expired Date : 07 December 2025
Serial No. : CC41587

Point	CALIBRATION RESULTS						
	Ideal	Actual NO	Error NO	%Error NO	Actual NO _x	Error NO _x	%Error NO _x
ZERO	0.00	0.20	0.20	-	0.10	0.10	-
SPAN 200 ppb	200.00	200.10	0.10	0.05	200.10	0.10	0.05
SPAN 400 ppb	400.00	400.20	0.20	0.05	400.10	0.10	0.03
AVERAGE (%)				0.05			0.04



Calibrated by : (Miss SUTHIDA SINGHAPHEN)
Client

Approved by : (Mr. RUNGASIKORN KOSUM)
Technical Manager

Analyzer Performance Test

Calibrated Date: 29 February 2024

Instruments Information

Analyzer Type : NO-NO2-NOx Analyzer
Model : 42C

Manufacturer : Thermo Environmental
Serial Number : 78440-389

Calibrator Unit

Dilutor Model : Dasibi Model 5008
Serial Number : 705
ZERO AIR Generator : API MODEL 701
Serial Number : 1924

Standard Gas Concentration

Nitric Oxide (NO) : 55.47 PPM
Sulphur Dioxide (SO₂) : 55.11 PPM
Carbon Monoxide (CO) : 4,535 PPM
Cylinder number : EB0129027
Expire Date : 29 Oct. 2027

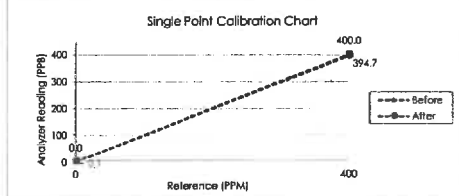
Environment : Temperature 25.5 °C Humidity 51 %RH

Calibration Report (Before Adjust)

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
NO	0.0	0.1	0.1	400.0	394.7	-1.3
NOx	0.0	0.0	0.0	400.0	394.5	-1.4

Calibration Report (After Adjust)

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
NO	0.0	0.1	0.1	400.0	400.0	0.0
NOx	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : กิตติศักดิ์ จันทะวงษ์วัฒนา
MR. KITTISAK JANGSANGWATANA

Approve by : MR. PASAGORN SAMOL

Analyzer Performance Test

Calibrated Date: 29 February 2024

Instruments Information

Analyzer Type : NO-NO2-NOx Analyzer
Model : 200A

Manufacturer : API
Serial Number : 645

Calibrator Unit

Dilutor Model : Dasibi Model 5008
Serial Number : 705
ZERO AIR Generator : API MODEL 701
Serial Number : 1924

Standard Gas Concentration

Nitric Oxide (NO) : 55.47 PPM
Sulphur Dioxide (SO₂) : 55.11 PPM
Carbon Monoxide (CO) : 4,535 PPM
Cylinder number : EB0129027
Expire Date : 29 Oct. 2027

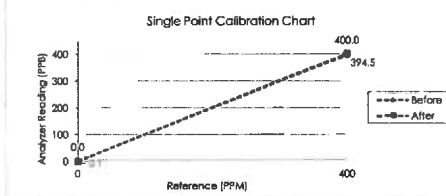
Environment : Temperature 25.5 °C Humidity 51 %RH

Calibration Report (Before Adjust)

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
NO	0.0	0.1	0.1	400.0	394.5	-1.4
NOx	0.0	0.0	0.0	400.0	394.4	-1.4

Calibration Report (After Adjust)

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
NO	0.0	0.1	0.1	400.0	400.0	0.0
NOx	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : กิตติศักดิ์ จันทะวงษ์วัฒนา
MR. KITTISAK JANGSANGWATANA

Approve by : MR. PASAGORN SAMOL



ENVIRO SERVICE CO., LTD.
42 Ramindra 14 Yeak 9, Tho Raeng, Bang Khen, Bangkok 10230
Tel. 02-9435814-5 Fax. 02-9436201 www.enviro-service.co.th

Analyzer Performance Test

Calibrated Date: 29 February 2024

Instruments Information

Analyzer Type : NO-NO₂-NO_x Analyzer
Model : 42C
Manufacturer : Thermo Environmental
Serial Number : 42CLS-759 47-381

Calibrator Unit
Dilutor Model : Dasibi Model 5008
Serial Number : 705
ZERO AIR Generator : API MODEL 701
Serial Number : 1924

Standard Gas Concentration
Nitric Oxide (NO) : 55.47 PPM
Sulphur Dioxide (SO₂) : 55.11 PPM
Carbon Monoxide (CO) : 4,535 PPM
Cylinder number : E80129027
Expire Date : 29 Oct. 2027

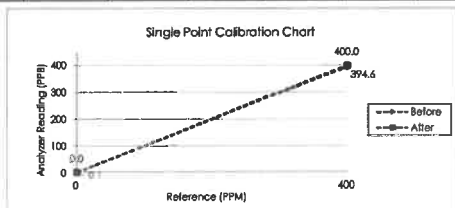
Environment : Temperature 25.5 °C Humidity : 51 %RH

Calibration Report (Before Adjust)

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
NO	0.0	0.1	0.1	400.0	394.6	-1.3
NO _x	0.0	0.0	0.0	400.0	394.8	-1.3

Calibration Report (After Adjust)

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
NO	0.0	0.1	0.1	400.0	400.0	0.0
NO _x	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : กิตติศักดิ์ จันทะวงษ์
MR. KITTISAK JANSANGWATTANA

Approve by : MR. PASAGORN SAMOL



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42 Ramindra 14 Yeak 9, Tho Raeng, Bang Khen, Bangkok 10230
Tel. 02-9435814-5 Fax. 02-9436201 www.enviro-service.co.th

Analyzer Performance Test

Calibrated Date: 29 February 2024

Instruments Information

Analyzer Type : NO-NO₂-NO_x Analyzer
Model : 42C
Manufacturer : Thermo Environmental
Serial Number : 0413406268

Calibrator Unit
Dilutor Model : Dasibi Model 5008
Serial Number : 705
ZERO AIR Generator : API MODEL 701
Serial Number : 1924

Standard Gas Concentration
Nitric Oxide (NO) : 55.47 PPM
Sulphur Dioxide (SO₂) : 55.11 PPM
Carbon Monoxide (CO) : 4,535 PPM
Cylinder number : E80129027
Expire Date : 29 Oct. 2027

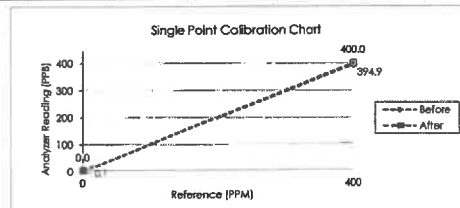
Environment : Temperature 25.5 °C Humidity : 51 %RH

Calibration Report (Before Adjust)

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
NO	0.0	0.1	0.1	400.0	394.9	-1.3
NO _x	0.0	0.0	0.0	400.0	394.6	-1.3

Calibration Report (After Adjust)

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
NO	0.0	0.1	0.1	400.0	400.0	0.0
NO _x	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : กิตติศักดิ์ จันทะวงษ์
MR. KITTISAK JANSANGWATTANA

Approve by : MR. PASAGORN SAMOL



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194 Moo 5, T.Kasems, A.U-Thai, Ayutthaya 13210, Thailand
Tel: 0-35226-383, 0-35800-593 Fax: 0-35800-594

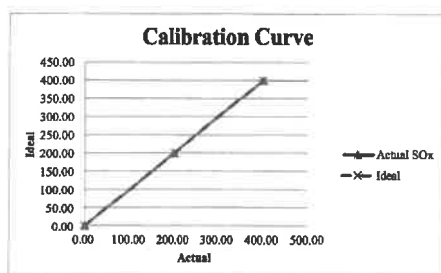
Sulfur Dioxide Analyzer Calibration Worksheet

Project Site : กรมอุตสาหกรรมปอเนาะ อุบลราชธานี
Location : อ.โขงเจียม
Date of measurement : 04 March 2024
Worksheet No. : C-040324-WWL 0109
Ambient SO_x Analyzer ID : WWL 0109
Manufacturer : HORIBA
Ambient SO_x Analyzer Model : APSA-370
Ambient SO_x Analyzer S/N : YDL839W0

Multi Gas Calibrator
Calibrator ID : WWL0128
Calibrator Model : Series 6100
Calibrator S/N : S/N 7462
Calibrate Date : 10 January 2023

Cylinder Std. Gas
Std. Gas Concentration (PPM) : 50.90
Cylinder Pressure (psi) : 2000
Certified Date : 07 December 2021
Expired Date : 07 December 2025
Serial No. : CC241587

Point	CALIBRATION RESULTS			
	Ideal	Actual SO _x	Error Sox	%Error Sox
ZERO	0.00	0.00	0.00	-
SPAN 200 ppb	200.00	200.20	0.20	0.10
SPAN 400 ppb	400.00	400.10	0.10	0.03
AVERAGE (%)				0.06



Calibrated by : MISS SUTTHIDA SINGHAPHEN
Client

Approved by : MR. RUNGSASIKORN KOSUM
Technical Management



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WATER ANALYSIS CENTER COMPANY LIMITED
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194 Moo 5, T.Kasems, A.U-Thai, Ayutthaya 13210, Thailand
Tel: 0-35226-383, 0-35800-593 Fax: 0-35800-594

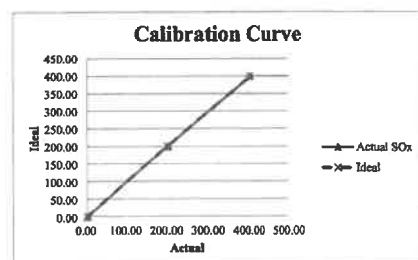
Sulfur Dioxide Analyzer Calibration Worksheet

Project Site : กรมอุตสาหกรรมปอเนาะ อุบลราชธานี
Location : อ.โขงเจียม
Date of measurement : 04 March 2024
Worksheet No. : C-040324-WWL 0110
Ambient SO_x Analyzer ID : WWL 0110
Manufacturer : HORIBA
Ambient SO_x Analyzer Model : APSA-370
Ambient SO_x Analyzer S/N : Y88W7T00

Multi Gas Calibrator
Calibrator ID : WWL0128
Calibrator Model : Series 6100
Calibrator S/N : S/N 7462
Calibrate Date : 10 January 2023

Cylinder Std. Gas
Std. Gas Concentration (PPM) : 50.90
Cylinder Pressure (psi) : 2000
Certified Date : 07 December 2021
Expired Date : 07 December 2025
Serial No. : CC241587

Point	CALIBRATION RESULTS			
	Ideal	Actual SO _x	Error Sox	%Error Sox
ZERO	0.00	0.10	0.10	-
SPAN 200 ppb	200.00	200.20	0.20	0.10
SPAN 400 ppb	400.00	400.10	0.10	0.03
AVERAGE (%)				0.06



Calibrated by : MISS SUTTHIDA SINGHAPHEN
Client

Approved by : MR. RUNGSASIKORN KOSUM
Technical Management



บริษัท ศูนย์วิเคราะห์น้ำ จำกัด
WATER ANALYSIS CENTER COMPANY LIMITED
194 หมู่ 5 ต.บางนาหน อ.อุทัย จ.พระนครศรีอยุธยา 13210
194 Moo 5, T.Kanhan, A.U-Thai, Ayutthaya 13210, Thailand
Tel: 0-35226-383, 0-35800-593 Fax: 0-35800-594

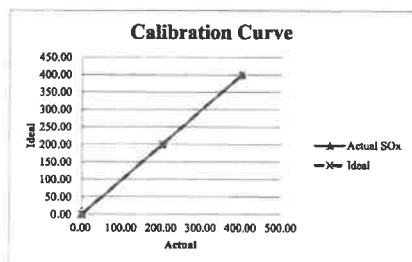
Sulfur Dioxide Analyzer Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะ อุตสาหกรรม
Location : บ้านนาหน
Date of measurement : 04 March 2024
Worksheet No. : C-040324-WWL 0111
Ambient SO₂ Analyzer ID : WWL 0111
Manufacturer : HORIBA
Ambient SO₂ Analyzer Model : APSA-370
Ambient SO₂ Analyzer S/N : FGKCTBDX

Multi Gas Calibrator
Calibrator ID : WWL0128
Calibrator Model : Series 6100
Calibrator S/N : S/N 7462
Calibrate Date : 10 January 2023

Cylinder Std. Gas
Std. Gas Concentration (PPM) : 50.90
Cylinder Pressure (psi) : 2000
Certified Date : 07 December 2021
Expired Date : 07 December 2025
Serial No. : CC241587

Point	CALIBRATION RESULTS			
	Ideal	Actual SO ₂	Error Sox	%Error Sox
ZERO	0.00	0.10	0.10	-
SPAN 200 ppb	200.00	200.10	0.10	0.05
SPAN 400 ppb	400.00	400.20	0.20	0.05
AVERAGE (%)				0.05



Calibrated by : (Miss SUTHIDA SINGHAPHEN)
Chemist

Approved by : (Mr. RUNGSASIKORN KOSUM)
Technical Management



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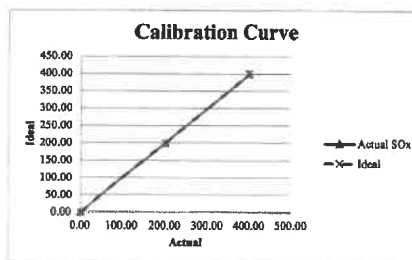
Sulfur Dioxide Analyzer Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะ อุตสาหกรรม
Location : บ้านนาหน
Date of measurement : 04 March 2024
Worksheet No. : C-040324-WWL 0021
Ambient SO₂ Analyzer ID : WWL 0021
Manufacturer : Thermo Environmental Instrument Inc.
Ambient SO₂ Analyzer Model : 43C
Ambient SO₂ Analyzer S/N : 43C-58282-317

Multi Gas Calibrator
Calibrator ID : WWL0128
Calibrator Model : Series 6100
Calibrator S/N : S/N 7462
Calibrate Date : 10 January 2023

Cylinder Std. Gas
Std. Gas Concentration (PPM) : 50.90
Cylinder Pressure (psi) : 2000
Certified Date : 07 December 2021
Expired Date : 07 December 2025
Serial No. : CC241587

Point	CALIBRATION RESULTS			
	Ideal	Actual SO ₂	Error Sox	%Error Sox
ZERO	0.00	0.00	0.00	-
SPAN 200 ppb	200.00	200.10	0.10	0.05
SPAN 400 ppb	400.00	400.20	0.20	0.05
AVERAGE (%)				0.05



Calibrated by : (Miss SUTHIDA SINGHAPHEN)
Chemist

Approved by : (Mr. RUNGSASIKORN KOSUM)
Technical Management



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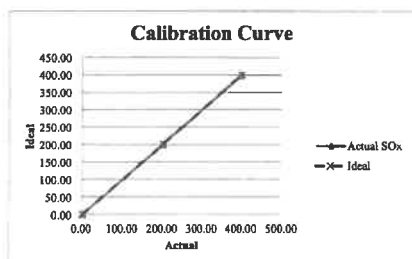
Sulfur Dioxide Analyzer Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะ อุตสาหกรรม
Location : บ้านนาหน
Date of measurement : 04 March 2024
Worksheet No. : C-040324-WWL 0113
Ambient SO₂ Analyzer ID : WWL 0113
Manufacturer : HORIBA
Ambient SO₂ Analyzer Model : APSA-370
Ambient SO₂ Analyzer S/N : WDMY8HT3

Multi Gas Calibrator
Calibrator ID : WWL0128
Calibrator Model : Series 6100
Calibrator S/N : S/N 7462
Calibrate Date : 10 January 2023

Cylinder Std. Gas
Std. Gas Concentration (PPM) : 50.90
Cylinder Pressure (psi) : 2000
Certified Date : 07 December 2021
Expired Date : 07 December 2025
Serial No. : CC241587

Point	CALIBRATION RESULTS			
	Ideal	Actual SO ₂	Error Sox	%Error Sox
ZERO	0.00	0.10	0.10	-
SPAN 200 ppb	200.00	200.10	0.10	0.05
SPAN 400 ppb	400.00	400.10	0.10	0.03
AVERAGE (%)				0.04



Calibrated by : (Miss SUTHIDA SINGHAPHEN)
Chemist

Approved by : (Mr. RUNGSASIKORN KOSUM)
Technical Management



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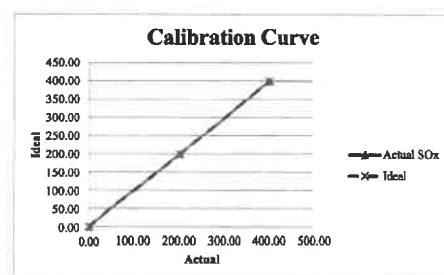
Sulfur Dioxide Analyzer Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะ อุตสาหกรรม
Location : บ้านนาหน
Date of measurement : 04 March 2024
Worksheet No. : C-040324-WWL 0112
Ambient SO₂ Analyzer ID : WWL 0112
Manufacturer : HORIBA
Ambient SO₂ Analyzer Model : APSA-370
Ambient SO₂ Analyzer S/N : 8R18JBB1

Multi Gas Calibrator
Calibrator ID : WWL0128
Calibrator Model : Series 6100
Calibrator S/N : S/N 7462
Calibrate Date : 10 January 2023

Cylinder Std. Gas
Std. Gas Concentration (PPM) : 50.90
Cylinder Pressure (psi) : 2000
Certified Date : 07 December 2021
Expired Date : 07 December 2025
Serial No. : CC241587

Point	CALIBRATION RESULTS			
	Ideal	Actual SO ₂	Error Sox	%Error Sox
ZERO	0.00	0.10	0.10	-
SPAN 200 ppb	200.00	200.20	0.20	0.10
SPAN 400 ppb	400.00	400.10	0.10	0.03
AVERAGE (%)				0.06



Calibrated by : (Miss SUTHIDA SINGHAPHEN)
Chemist

Approved by : (Mr. RUNGSASIKORN KOSUM)
Technical Management



ENVIR SERVICE CO., LTD.
42 Ramintra 14 Yeak 9, Tha Raeng, Bang Khen, Bangkok 10230
Tel. 02-9435814-5 Fax. 02-9438201 www.envirservice.co.th

Analyzer Performance Test

Calibrated Date: 01 March 2024

Instruments Information

Analyzer Type : SO₂ Analyzer
Model : 100A

Manufacturer : API
Serial Number : 375

Calibrator Unit

Dilutor Model : Dasibi Model 5008
Serial Number : 705
ZERO AIR Generator : API MODEL 701
Serial Number : 1924

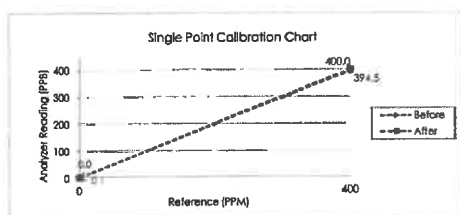
Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM
Sulphur Dioxide (SO₂) 55.11 PPM
Carbon Monoxide (CO) 4,535 PPM
Cylinder number EB0129027
Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	394.5	-1.4
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : กิตติศักดิ์ จันทะวงษ์วัฒนา
MR. KITTISAK JANSANGWATTANA

Approve by : MR. PASAGORN SAMOL



ENVIR SERVICE CO., LTD.
42 Ramintra 14 Yeak 9, Tha Raeng, Bang Khen, Bangkok 10230
Tel. 02-9435814-5 Fax. 02-9438201 www.envirservice.co.th

Analyzer Performance Test

Calibrated Date: 01 March 2024

Instruments Information

Analyzer Type : SO₂ Analyzer
Model : 100A

Manufacturer : API
Serial Number : 1192

Calibrator Unit

Dilutor Model : Dasibi Model 5008
Serial Number : 705
ZERO AIR Generator : API MODEL 701
Serial Number : 1924

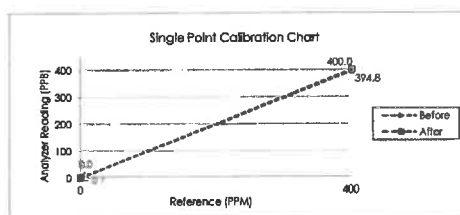
Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM
Sulphur Dioxide (SO₂) 55.11 PPM
Carbon Monoxide (CO) 4,535 PPM
Cylinder number EB0129027
Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	394.8	-1.3
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : กิตติศักดิ์ จันทะวงษ์วัฒนา
MR. KITTISAK JANSANGWATTANA

Approve by : MR. PASAGORN SAMOL



ENVIR SERVICE CO., LTD.
42 Ramintra 14 Yeak 9, Tha Raeng, Bang Khen, Bangkok 10230
Tel. 02-9435814-5 Fax. 02-9438201 www.envirservice.co.th

Analyzer Performance Test

Calibrated Date: 01 March 2024

Instruments Information

Analyzer Type : SO₂ Analyzer
Model : 431

Manufacturer : Thermo Environmental
Serial Number : 0630718534

Calibrator Unit

Dilutor Model : Dasibi Model 5008
Serial Number : 705
ZERO AIR Generator : API MODEL 701
Serial Number : 1924

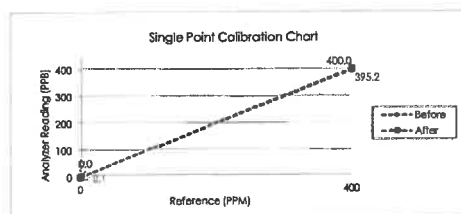
Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM
Sulphur Dioxide (SO₂) 55.11 PPM
Carbon Monoxide (CO) 4,535 PPM
Cylinder number EB0129027
Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	395.2	-1.2
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : กิตติศักดิ์ จันทะวงษ์วัฒนา
MR. KITTISAK JANSANGWATTANA

Approve by : MR. PASAGORN SAMOL



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42 Ramintra 14 Yeak 9, Tha Raeng, Bang Khen, Bangkok 10230
Tel. 02-9435814-5 Fax. 02-9438201 www.envirservice.co.th

Analyzer Performance Test

Calibrated Date: 01 March 2024

Instruments Information

Analyzer Type : SO₂ Analyzer
Model : 431

Manufacturer : Thermo Environmental
Serial Number : 0614416629

Calibrator Unit

Dilutor Model : Dasibi Model 5008
Serial Number : 705
ZERO AIR Generator : API MODEL 701
Serial Number : 1924

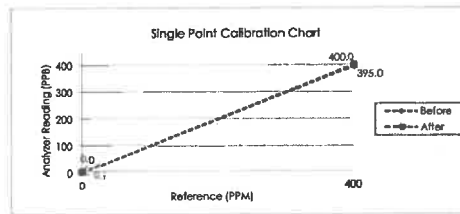
Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM
Sulphur Dioxide (SO₂) 55.11 PPM
Carbon Monoxide (CO) 4,535 PPM
Cylinder number EB0129027
Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	395.0	-1.3
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : กิตติศักดิ์ จันทะวงษ์วัฒนา
MR. KITTISAK JANSANGWATTANA

Approve by : MR. PASAGORN SAMOL

Certificate Number

CL-026-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM : Wind Direction Sensor
MANUFACTURER : Novityna
MODEL/TYPE : Sensor: WS-02F
Data logger: 280-WS-25LB
SERIAL NUMBER : Sensor: KS-040
Data logger: AS040
ID NUMBER :
CONDITION AS RECEIVED : Used Item
CUSTOMER : Water Analysis Center Co., Ltd.
84/1 Moo 5, T.Janinam, A.U-thai, Ayutthaya 13210

RECEIVED DATE : 10 Mar 2023
MEASUREMENT DATE : 13 Mar 2023
ISSUE DATE : 13 Mar 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 : 1010.8 ± 10 hPa

PLACE OF CALIBRATION : Eiffel-type wind tunnel of Jirantee 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 (23.87 °C, (41.2) %RH and (1012.3) hPa.

TABULATION OF RESULTS
The table on next page give the measured values.

Calibrated by:
Mr. Sorawit Theakulad
Mr. Jiraporn Terabongphol



Approved signature: Mr. Pattaya Booncharoen
Calibration Department Manager

Remarks:
¹ Include 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 "a" to "b"

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

Certificate Number

CL-026-66

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

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 ₁₀₀ Degree (°)	D ₁₀₀ Degree (°)	Error Degree (°)	U (k=2) Degree (°)
	45.000	41	-4	1.0
	90.000	87	-3	1.0
	135.000	153	-2	1.0
5.05	180.000	180	0	1.0
	225.000	227	2	1.0
	270.000	273	3	1.0
	315.000	319	4	1.0
	360.000	359	-1	1.0

Remarks:

¹ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place

² Direction of standard

³ Direction of Unit Under Calibration

End of Calibration

Certificate Number

CL-026-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM : Cup anemometer
MANUFACTURER : Novityna
MODEL/TYPE : Sensor: WS-02F
Data logger: 280-WS-25LB
SERIAL NUMBER : Sensor: KS-040
Data logger: AS040
ID NUMBER :
CONDITION AS RECEIVED : Used Item
CUSTOMER : Water Analysis Center Co., Ltd.
84/1 Moo 5, T.Janinam, A.U-thai, Ayutthaya 13210

RECEIVED DATE : 10 Mar 2023
MEASUREMENT DATE : 13 Mar 2023
ISSUE DATE : 13 Mar 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 : 1010.8 ± 10 hPa

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

CALIBRATION CONDITIONS
Wind tunnel cross-section area¹ : 900 cm²
Win direction frontal area² : 100 cm²
Diameter of mounting pipe³ : - mm
Blockage ratio of test object⁴ : 0.111 [-]

Preconditioning : 24 hours at ambient conditions.
Measurement Condition : The average values during measurement are (24.5) °C, (42.9) %RH and (1008.6) hPa.

TABULATION OF RESULTS
The table on next page give the measured values.

Calibrated by:
Mr. Sorawit Theakulad
Mr. Jiraporn Terabongphol



Approved signature: Mr. Pattaya Booncharoen
Calibration Department Manager

Remarks:
¹ Include 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 "a" to "b"

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

Certificate Number

CL-026-66

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The cup anemometer, Unit Under Calibration (UUC) was exercise 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} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V _{std} (m/s)	Error (m/s)	U (k=2) (m/s)
1.037	24.34	24.45	0.9	-0.1	0.31
2.032	24.70	24.45	1.9	-0.1	0.31
3.054	24.46	24.45	3.0	-0.1	0.31
4.317	24.70	24.45	4.0	-0.3	0.31
5.02	24.40	24.45	4.9	-0.1	0.31
5.99	24.70	24.45	5.9	-0.1	0.31
7.04	24.40	24.45	6.9	-0.1	0.31
8.17	24.62	24.45	8.1	-0.1	0.31
9.07	24.34	24.45	9.0	-0.3	0.31
10.07	24.40	24.45	10.0	-0.1	0.31
11.13	24.50	24.45	11.1	0.0	0.31
12.12	24.36	24.45	12.0	-0.1	0.34
13.18	24.50	24.45	13.1	-0.1	0.33
14.24	24.40	24.45	14.0	-0.1	0.31
15.22	24.40	24.45	15.0	-0.3	0.31
16.27	24.40	24.45	16.0	-0.2	0.41

Remarks:

¹ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place

² Velocity of standard

³ Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP



Calibration set-up of the cup anemometer calibration in the wind tunnel of Jirantee 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 Calibration

แบบบันทึกการตรวจสอบเครื่อง Sound Level Meter

เครื่อง CA111 Sound Calibrator S/N 520272 รหัสเครื่อง SR004 เกณฑ์การยอมรับ 93.77 ± 0.3, 113.84 ± 0.3
วันที่สอบเทียบ 24/05/63 วันที่สอบเทียบครั้งต่อไป 23/05/66
เครื่อง Digital Thermohygro Meter S/N 105091609 รหัสเครื่อง WWL 0055
วันที่สอบเทียบ 29/11/66 วันที่สอบเทียบครั้งต่อไป 28/11/67
เครื่อง Sound Level Meter S/N 200053 รหัสเครื่อง WWL 0208
วันที่สอบเทียบ 15-18/1/65 วันที่สอบเทียบครั้งต่อไป 14/11/67

การตรวจสอบก่อนออกหน้างาน

อุณหภูมิ (°C) 24 เกณฑ์การยอมรับ 23.0±3.0
ความชื้นสัมพัทธ์ (%) 50 เกณฑ์การยอมรับ 50.0±15.0
วันที่ตรวจสอบ 05/03/67

การตรวจสอบหลังจากออกหน้างาน

อุณหภูมิ (°C) 24 เกณฑ์การยอมรับ 23.0±3.0
ความชื้นสัมพัทธ์ (%) 52 เกณฑ์การยอมรับ 50.0±15.0
วันที่ตรวจสอบ 11/03/67

Item	ระดับเสียงที่วัดได้ (dB) (ความดังที่ 94.0dB)	ระดับเสียงที่วัดได้ (dB) (ความดังที่ 114.0dB)	Item	ระดับเสียงที่วัดได้ (dB) (ความดังที่ 94.0dB)	ระดับเสียงที่วัดได้ (dB) (ความดังที่ 114.0dB)
1	93.8	113.8	1	93.8	113.8
2	93.8	113.8	2	93.8	113.8
3	93.8	113.8	3	93.8	113.8
4	93.8	113.8	4	93.8	113.8
5	93.8	113.8	5	93.8	113.8
6	93.8	113.8	6	93.8	113.8
7	93.8	113.8	7	93.8	113.8
8	93.8	113.8	8	93.8	113.8
9	93.8	113.8	9	93.8	113.8
10	93.8	113.8	10	93.8	113.8
X	93.80	113.80	X	93.80	113.80
SD	0.00	0.00	SD	0.00	0.00
%RSD (≤ 10)	0.00	0.00	%RSD (≤ 10)	0.00	0.00
หมายเหตุ ผ่าน	ผ่าน	ผ่าน	หมายเหตุ ผ่าน	ผ่าน	ผ่าน

ผู้บันทึก ธนวิทย์
ผู้ตรวจสอบ ธนวิทย์

ผู้บันทึก ธนวิทย์
ผู้ตรวจสอบ ธนวิทย์

Certificate of System Qualification
GC-QQ + GCMS-QQ

System ID: RYG_END136
Organization Name: ALS Laboratory Group (Thailand) Co.Ltd.
Organization Location: 618/10, Moo 5, Tambol Mae Nam Khru, Phak Daeng, Rayong, 21146, Thailand

Date: January 5, 2024 10:53:24 AM
EQP Name: Agilent/Recommended, Agilent/Recommended
EQP Revision: GC.02.54, GCMS.02.54
Overall Qualification Status: Pass

REVIEW BY Chonichai
APPROVED BY ธนวิทย์
NEXT CAL DATE 10/1/2026

CDS Logon Verification - GC

Logon: chonichai.khunkaew

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

Setpoint Status: Pass

Inlet Pressure: 25.0 psi

Accuracy: 0.0 psi

Agilent Recommended: <± 1.2 psi

Date: January 5, 2024 10:53:24 AM
System ID: RYG_END136

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Overall Inlet Pressure Accuracy Test Status
Pass

GC Oven Temperature Accuracy

Name: 7890
Setpoint Status: Pass
Zone: Oven
Temperature: 230.0 229 °C
Accuracy: -1.0 °C
Agilent Recommended: >± 1.0 °C
Setpoint Status: Pass
Zone: Oven
Temperature: 100.0 100.8 °C
Accuracy: 0.8 °C
Agilent Recommended: >± 1.0 °C

Setpoint Status: Pass
Zone: Oven
Temperature: 100.0 100.8 °C
Accuracy: 0.8 °C
Agilent Recommended: >± 1.0 °C

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890
Setpoint Status: Pass
Temperature: 100.0 100.8187 °C
Stability: 0.1 °C
Agilent Recommended: <± 0.5 °C

Overall GC Oven Temperature Stability Test Status

Pass

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Log Amp

Tested Combination: Front SSL / External SQ
Name: 5977B
Setpoint Status: Pass

Overall Log Amp Test Status

Pass

RPPA

Tested Combination: Front SSL / External SQ
Name: 5977B
Setpoint Status: Pass
Amu: 1050 m/z
Drift After Five Minutes: 6 mV
RPPA Voltage: 609 mV
Agilent Recommended: >± 100 and <± 100 <± 1100

Overall RPPA Test Status

Pass

Tune EI

Tested Combination: Front SSL / External SQ
Name: 5977B
Setpoint Status: Pass

Filament: 1

Setpoint Status: Pass

Filament: 2

Setpoint Status: Pass

Overall Tune EI Test Status

Pass

Scouting Run

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Tested Combination1 Front SSL / External SQ
Manual Injection
Name: Not applicable
Source: EI - Extractor
Setpoint Status: Completed
Injection Volume on Column: 1.0 µL
Overall Scouting Run Status: Completed

Signal to Noise EI

Tested Combination1 Front SSL / External SQ
Name: 5977B
Source: EI - Extractor Filament: 1
Setpoint Status: Pass
Signal to Noise: 5113
Agilent Recommended: >= 1200
Source: EI - Extractor Filament: 2
Setpoint Status: Pass
Signal to Noise: 4468
Agilent Recommended: >= 1200

Overall Signal to Noise EI Test Status

Pass

NOTE: This test's 2 comment(s) and 3 deviation(s) are available in the Attachments section.

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System ID: RYG_END136

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Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID: RYG_END136
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

Methanone 1

Manufacturer: Agilent Technologies
Name: 7890
Model Number: G3442B
Serial Number: CN15463238
Firmware Revision: B.02.04.3
Component ID/Asset No.: 061117000236
Oven Type: Standard

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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
Model Number: G7077B
Serial Number: US1701M00B
Firmware Revision: 5977 6.00.34
High Vacuum System: Turbo Pump
Scouting Run Standard: OFN Std
Component ID/Asset No.: 061117000236

MS EI Source 1

Manufacturer: Agilent Technologies
Source Type: EI - Extractor
Number of Elements: 2

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System ID: RYG_END136

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Electronic Signature

Purpose

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

Details

Full Name of Signer: Estelwin Puengtoops
Logged On User Name: estelwin_puengtoops@agilent.com
Signature Creation Date: January 5, 2024
Reason for Signature: Executed protocol and published this original version of document

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Date: January 5, 2024 10:53:24 AM
System ID: RYG_END136

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User Name: ccm@ta_posgr004			Station ID: RYD_SPD136	
Report Generated by Ntstamper: ASRYQNC007			Print Date: January 6, 2004 19:55:25 AM	
<u>ALE_001_RYD_SPD136 Transaction Log :</u>				
<u>Date</u>	<u>Transaction Date</u>	<u>Activity Performed</u>	<u>Type of Transaction</u>	<u>Optional Information</u>
January 4, 2004 18:27:31 AM	Auth	SessionClosed	Session	Name
January 4, 2004 18:37:51 AM	Start	Configuration	Session	Name
January 4, 2004 18:37:21 AM	Auth	Environment	Logging	User is FieldAgent and does not require an initial code
January 4, 2004 18:38:25 AM	Auth	ExpLoaded	Session	GOP details for primary activation [Gd] - File path: PhysicalPath\OutConfig\item02.SACcA2.04.asp. EOP File Name: [C:\26.24.asp]. EOP Name: [agentAccessControlPrimsalRandom].[02.32.64] EOP details for hyperlinked activities [GdAdj] - File path: PhysicalPath\Utils\CasidyLemon02.SACcA2.03.5A.sqf. WCP File Name: [GCHB.G2.SA.asp]. EOP Name: [WcpNetAccessControl]
January 4, 2004 18:38:40 AM	End	CatPopMain	Session	Name
January 4, 2004 18:38:04 AM	Start	Qualification	Session	DG
January 4, 2004 19:38:44 AM	Start	Execution	CDS Logic Verification - OC - 7982 - Qualitative test	Name
January 4, 2004 19:48:03 AM	End	Execution	CDS Logic Verification - OC - 7980 - Qualitative test	Plan Count : 1

Time	Transaction State	Activity Pattern/Mode	Type of Transaction	Optional Information
January 4, 2024 12:45:08 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7887 - Qualifies Test - No warnings associated	None
January 4, 2024 10:16:10 AM	End	Execution	System Inspection and Basic Safety and Operation - 7888 - Qualifies Test - No warnings associated	Run Count : 1
January 4, 2024 10:41:20 AM	Start	Execution	Inlet Pressure Accuracy - Ford S2L - Penicillin Chloride test - E: 28.0 psi - L: == 1.0 psi	None
January 4, 2024 10:46:52 AM	End	Execution	Inlet Pressure Accuracy - Ford S2L - Penicillin Chloride test - E: 28.0 psi - L: == 1.0 psi	Run Count : 1
January 4, 2024 10:49:54 AM	Start	Execution	QC Oven Temperature Accuracy - 7890 - Temperature : Oven - E: 250.0°C - L: == -1.0 AND == 1.0 % subject to K	None
January 4, 2024 10:51:38 AM	End	Data	QC Oven Temperature Accuracy - 7890 - Temperature : Oven - E: 250.0°C - L: == -1.0 AND == 1.0 % subject to K	Manual Data Entry
January 4, 2024 10:51:40 AM	End	Execution	QC Oven Temperature Accuracy - 7888 - Temperature : Oven - E: 250.0°C - L: == -1.0 AND == 1.0 % subject to K	Run Count : 1
January 4, 2024 10:51:43 AM	Start	Execution	QC Oven Temperature Accuracy - 7890 - Temperature : Oven - E: 250.0°C - L: == -1.0 AND == 1.0 % subject to K	None
January 4, 2024 10:56:48 AM	End	Data	QC Oven Temperature Accuracy - 7890 - Temperature : Oven - E: 250.0°C - L: == -1.0 AND == 1.0 % subject to K	Manual Data Entry

User: Nister: 888Nister_Bus030404			System: 66: RYQ_E04139	
Report Generated by: Nister: ASR1009/2074			Print Date: January 3, 2024 16:53:25 AM	
ALS_Q01_RYQ_E04139 Temperature log				
Time	Transaction Date	Activity Performed	Type of Transaction	Optional Information
January 4, 2024 16:59:48 AM	End	Execution	OC Oven Temperature Accuracy - 7880.2 - Temperature - Oven - 18, 100.0°C - L - <= -1.0 A/D - <= 1.0 % absolute N.H.	Run Count : 1
January 4, 2024 16:58:59 AM	Start	Execution	OC Oven Temperature Stability - 7880.2 - Temperature - Oven - 6, 100.0°C - L - <= 0.5°C	None
January 4, 2024 11:22:26 AM	End	Date	OC Oven Temperature Stability - 7880.2 - Temperature - Oven - 3, 100.0°C - L - <= 0.5°C	Manual Data Entry
January 4, 2024 11:22:26 AM	End	Execution	OC Oven Temperature Stability - 7880.2 - Temperature - Oven - 3, 100.0°C - L - <= 0.5°C	Run Count : 1
January 4, 2024 11:23:35 AM	Start	Execution	Lag Amp - 5677B SQ - Source: None	None
January 4, 2024 11:42:23 AM	End	Execution	Lag Amp - 5677B SQ - Source: None	Run Count : 1
January 4, 2024 11:42:28 AM	Start	Execution	RPPA - 9877B SQ - Source: None	None
January 4, 2024 11:51:23 AM	End	Execution	RPPA - 9877B SQ - Source: None	Run Count : 1
January 4, 2024 11:53:26 AM	Start	Execution	Tube EI - 5677B SQ - Source: None	None
January 4, 2024 1:37:28 PM	End	Execution	Tube EI - 5677B SQ - Source: None	Run Count : 1
January 4, 2024 1:37:28 PM	Start	Execution	Tube EI - 5677B SQ - Source: None	None

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Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 4, 2024 1:48:50 PM	Start	Execution	Test E1 - RWTH SQ - Source - Run Count - 1 E1 - Extractor Platform 2 (Destination - No subjects immediate)	
January 4, 2024 5:49:02 PM	Start	Execution	Scanning Run - Manual Injection, From SSB, SQ - Source - E1 - Extractor - Part of OCAS System Preparation	None
January 4, 2024 2:20:35 PM	Abort	Accidental	Session	None
January 5, 2024 6:28:16 AM	Abort	Accidental	Session	None
January 5, 2024 8:29:14 AM	Abort	Service/Forbidden	Session	None
January 5, 2024 8:29:29 AM	Start	Configuration	Session	OO
January 5, 2024 8:38:29 AM	Start	Execution	Scanning Run - Manual Injection, From SSB, SQ - Source - E1 - Extractor - Part of OCAS System Preparation	None
January 5, 2024 9:21:29 AM	Abort	Data	Scanning Run - Manual Injection, From SSB, SQ - Source - E1 - Extractor - Part of OCAS System Preparation	Disable this Path - D:\OCAS\Resum1.D
January 5, 2024 9:21:53 AM	Start	Execution	Scanning Run - Manual Injection, From SSB, SQ - Source - E1 - Extractor - Part of OCAS System Preparation	Run Count: 1
January 5, 2024 9:21:58 AM	Start	Execution	Signal in Focus E1 - Liquid Injection, From SSB, SQ - Source - E1 - Extractor using Fawcett 1 - L; == 1200	None

User Name: admin@_jungsangpae
Report Generated by Hostname: ASRYCH0376
System ID: RYO_EH0136
Print Date: January 5, 2024 11:53:25 AM

ALS_OQ_RYO_EH0136 Transaction Log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 5, 2024 9:22:39 AM	End	Qualification	Session	QC
January 5, 2024 9:25:36 AM	Start	Reporting	Session	None
January 5, 2024 9:27:46 AM	End	Reporting	Session	None
January 5, 2024 9:27:46 AM	Start	Qualification	Session	QC
January 5, 2024 9:27:46 AM	Start	Execution	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 1 - LC == 1200	None
January 5, 2024 9:33:18 AM	Auto	Data	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 1 - LC == 1200	Data File Path : C:\OQ\DATA\H1_F1.D
January 5, 2024 9:49:22 AM	End	Execution	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 1 - LC == 1200	Run Count : 1
January 5, 2024 9:49:32 AM	Start	Execution	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 2 - LC == 1200	None
January 5, 2024 9:56:13 AM	Auto	Data	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 2 - LC == 1200	Data File Path : C:\OQ\DATA\H1_F2.D
January 5, 2024 10:00:59 AM	End	Execution	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 2 - LC == 1200	Run Count : 1

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Date: January 5, 2024 10:53:24 AM
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User Name: admin@_jungsangpae
Report Generated by Hostname: ASRYCH0376
System ID: RYO_EH0136
Print Date: January 5, 2024 10:53:25 AM

ALS_OQ_RYO_EH0136 Transaction Log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 5, 2024 10:02:53 AM	Auto	Test Unlocked	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 2 - LC == 1200	Deviation Noted for Run Count : 1
January 5, 2024 10:03:53 AM	Start	Execution	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 2 - LC == 1200	None
January 5, 2024 10:12:46 AM	Auto	Data	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 2 - LC == 1200	Data File Path : C:\OQ\DATA\H1_F3.D
January 5, 2024 10:17:38 AM	End	Execution	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 2 - LC == 1200	Run Count : 2
January 5, 2024 10:22:04 AM	Auto	Test Unlocked	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 2 - LC == 1200	Deviation Noted for Run Count : 2
January 5, 2024 10:22:04 AM	Start	Execution	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 2 - LC == 1200	None
January 5, 2024 10:22:16 AM	Auto	Data	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 2 - LC == 1200	Data File Path : C:\OQ\DATA\H1_F3.D
January 5, 2024 10:29:57 AM	End	Execution	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 2 - LC == 1200	Run Count : 3

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User Name: admin@_jungsangpae
Report Generated by Hostname: ASRYCH0376
System ID: RYO_EH0136
Print Date: January 5, 2024 11:53:25 AM

ALS_OQ_RYO_EH0136 Transaction Log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 5, 2024 10:25:17 AM	Auto	Test Unlocked	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 2 - LC == 1200	Deviation Noted for Run Count : 3
January 5, 2024 10:28:11 AM	Start	Execution	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 2 - LC == 1200	None
January 5, 2024 10:43:05 AM	Auto	Data	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 2 - LC == 1200	Data File Path : C:\OQ\DATA\H1_F03.D
January 5, 2024 10:46:54 AM	End	Execution	Signal to Valve E1 - Liquid Injection, Front SBL, QC - Source: E1 - Extractor using Filament 2 - LC == 1200	Run Count : 4
January 5, 2024 10:49:41 AM	End	Qualification	Session	QC
January 5, 2024 10:49:41 AM	Start	Reporting	Session	None
January 5, 2024 10:50:27 AM	Auto	Reporting	Session	Report Generated : CoreCase
January 5, 2024 10:51:57 AM	Auto	Reporting	Session	Report Generated : Report
January 5, 2024 10:51:29 AM	Auto	Reporting	Session	Report Generated : CertCase
January 5, 2024 10:52:00 AM	Auto	Reporting	Session	Report Generated : Report

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System ID: RYO_EH0136

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