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เอกสารสอบเทียบเครื่องมือที่ใช้ในการวิเคราะห์



## 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, Ayuthaya 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  
Thanagorn Litchaicharoen  
(Calibration Supervisor)

Approved by : Atitpong  
Atitpong Kasjanawasi  
(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

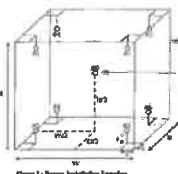
### 1. Calibration Procedure:

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

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### 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]

การควบคุม ๖-1

## 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, Ayuthaya 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

( ) ( Krisyosl K. ) ( ) ( Sakda Y. )  
( ) ( Patiphan K. ) ( ) ( Onnape P. )  
( ) ( Pongsak H. ) ( ) ( Nitiphong K. )  
( ) ( Kanung C. ) ( ) ( Nonthachai K. )  
( ) ( Pramong P. ) ( ) ( Noppol P. )

( Dr. Ekachai Putikwong )

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FE-169

REV.02 02/24/21



Certificate No.: C0-1907007/23

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.: 93X219065)

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

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## CERTIFICATE OF CALIBRATION

Certificate No.: C0-1808005/23

Page 1 of total 4 pages

Customer

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

Equipment

pH Meter

Manufacturer

METTLER TOLEDO

Model

SevenCompact S220

Serial No.

B327527211

ID No.

WWL 0068

Description

Range : 0 - 14 pH, Resolution : 0.01 pH

Environmental Conditions

Ambient Temperature:  $(20 \pm 2) ^\circ\text{C}$   
Relative Humidity:  $(50 \pm 10) \%$   
Atmospheric Pressure: -

Calibration Location

Jayhawk Laboratory (CL&GL)

Received Date

18 August 2023

Calibration Date

18 August 2023

Date of Issue

21 August 2023

Condition of Artifacts

Used conditions but can be calibrated

Checked by

Act as Technical Manager

Approved by

Representative of Managing Director

( ) (Krisyos K.) ( ) (Salida Y.)  
( ) (Patiphan K.) (✓) (Onnape P.)  
( ) (Pongsak H.) ( ) (Niripong K.)  
( ) (Kanung C.) ( ) (Nonthachai K.)  
( ) (Pramong P.) ( ) (Noppol P.)

( Dr. Ekachai Putirirong )

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

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REV.02 02/24/21



Certificate No.: C0-1808005/23

Page 2 of total 4 pages

Reference Method:

- The calibration method used was CP-178 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:

Type	pH Value	Lot No.	Due Date	Traceability
pH Standard Solution	4.01	030822	Feb. 9, 2024	NIMT
	7.01	300522	Feb. 9, 2024	
	10.01	230822	Feb. 7, 2024	

Type	Model	Serial No.	Certificate No.	Due Date	Traceability
Documenting Process Calibrator	754	2630521	10-2412001/22	Dec. 23, 2023	THC
Digital Thermometer with Sensor	1523 / 5622	1709138 / 4605984-005	10-0806001/23	Jun. 8, 2024	

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:  
- NIMT, National Institute of Metrology (Thailand).  
- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

1. Function Simulated pH Meter

Standard Applied (mV)	Nominal Value (pH)	UUC Reading		Uncertainty ( $\pm$ mV)
		pH	mV	
177.48	4.00	4.01	177.4	0.060
0.00	7.00	7.00	0.0	0.060
-177.48	10.00	10.01	-177.4	0.060

UUC : Unit Under Calibration

Note: Adjust Curve to simulate pH (4,7,10)

Calibrated by Kittipong  
REV.02 02/24/21

FE-169

ภาคผนวก ข-2

Certificate No.: C0-1808005/23

Page 3 of total 4 pages

Measurement Results (Cont.):

2. Calibration of pH Electrode (Serial No.: 3222623)

pH Standard Solution (pH)	Measured Value		Uncertainty ( $\pm$ pH)
	(pH)	(mV)	
4.01	4.01	180.0	0.013
7.01	7.00	4.0	0.013
10.01	10.01	-172.0	0.013

Note: Adjust Curve to Buffer Solution pH (4,7,10)

Temperature stability of micro bath :  $25 \pm 0.2 ^\circ\text{C}$

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%.

Calibrated by Kittipong  
REV.02 02/24/21



THAI HEART CALIBRATION CO., LTD.



Certificate No.: CO-1808005/23

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## Reference Method:

- The calibration method used was CP-096 based on an in-house method.
- The temperature scale used was an ITS-90.
- 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 Instruments:

Type	Model	Serial No.	Cert. No.	Due Date	Traceability
Thermometer Readout	1529-R	B7C853	10-0911001/22	Nov. 9, 2023	THC
Platinum Resistance Thermometer	5626	4854	COA30047	Oct. 22, 2023	FLUKE
Liquid Bath	XORTS-40A	XO111019	10-2405001/23	May 25, 2023	THC

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

- THC, Thai Heart Calibration Co., Ltd.
- FLUKE, Fluke Corporation, U.S.A.

## Measurement Results:

(X) Without Adjustment

Dimension of probe: Diameter	4 mm.	Sensor Type: RTD (PT100)		
Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
120	22.00	22.2	-0.20	0.065
120	25.00	25.2	-0.20	0.065
120	28.00	28.2	-0.20	0.065

UUC: Unit Under Calibration

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   
REV.02 02/24/21

AUTOMATION SERVICE CO.,LTD.  
CALIBRATION LABORATORY

SV 201003/2023

Cert. No. WAC-065  
Page 1 of 2

## CERTIFICATE OF CALIBRATION

Instrument : DO Meter  
Model : DO-31P  
Serial No. : 780065  
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 : 05 / 01 / 2023  
Date Of Calibration : 05 / 01 / 2023

Ambient Condition : Temperature 25 °C  
Humidity 50 % RH

Calibrated By :

  
(Ms. Phanee Yooyen)  
Technician

Approved By :

  
(Mr. Nipon Phungsomsak)  
Technical Manager

Date Of Issue : 09 / 01 / 2023

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.

PB-149

AUTOMATION SERVICE CO.,LTD.  
CALIBRATION LABORATORY

Instrument : DO Meter  
Model : DO-31P  
Serial No. : 780065

Cert. 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	1.06657.0500	K54224057	-	30 Sep 2023

2). Traceability This certification is traceable to

- ☒ Merck KGaA 64271 Darmstadt
- ☐ DKK Corporation

## Result Of Calibration

Standard Solution (mg/l) at 24.1°C	Before Adjust		After Adjust	
	Indicator	Error	Indicator	Error
Zero	0.00	+ 0.05	0.00	-
Span	8.25	- 1.12	8.25	-

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

Calibrated By   
(Ms. Phanee Yooyen)  
Technician



Master Calibration Co.,Ltd.

547 Soi Ratchadapisek, Kwang Sammak, Khwaeng Huaykwang, Bangkok 10010  
Tel. : (02) 274 2978-9, (02) 274 2977-8 Fax : (02) 274 2518, (02) 274 2999  
Website : www.mastercalibration.com E-mail : calteam@mastercalibration.com

## Certificate of Calibration

TEMPERATURE  
CONTROLLER ENCLOSURES

Certificate No.: MC 2303684

Page 1 of 3

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

Reference Job No. : 23-0729 Received Date : 23 March 2023  
Description : Oven  
Manufacturer : Memmert Model : UF260  
Serial No. : BG20.0814 ID. No. : WWL0212  
Marking : Additionally for the purpose of identification by this laboratory a label marked with this certificate number ( MC 2303684 ) 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 : ( 27.1 to 29.3 ) °C  
Relative Humidity : ( 38.0 to 72.2 ) %

Date of Calibration : 23 March 2023 Date of Issue : 24 March 2023

Checked by :   
Thansorn Limchaisarn  
(Calibration Supervisor)

Approved by :   
Atitpong Kattanasri  
(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 reference standard laboratories. 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.

Certificate No.: MC 2303684

Page 2 of 3

**The Reference Standard :**

Description	Certificate No.	Serial No.	Due date
Data Acquisition/Switch Unit	MC 2303173	MY41010916	9 March 2024

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

This certificate is traceable to the international system of units maintained at:

Master Calibration Co., Ltd.

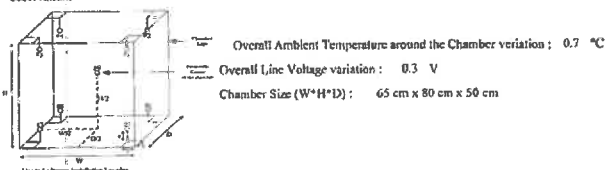
**1. Calibration Procedure:**

This instrument was calibration according to T1 AS 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.



Certificate No.: MC 2303684

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	
104	103.7	103.9	103.6	103.8	103.7	104.2	104.1	104.2	104.3	0.5B
180	179.4	179.8	179.4	179.7	179.4	179.9	179.8	180.2	180.0	1.3

**Chamber Characterization Result**

Controlled Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (°C)	Temperature Uniformity (°C)	Overall Variation (°C)
104	104	0.32	0.84	1.2
180	180	0.4	0.9	1.3

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 report will certify of the calibrated equipment only.

End of Certificate



**Certificate of Calibration**

**Equipment:** Balance  
Model: BL 210S  
Serial No. (or ID.): 15908131 (WWL 0022)  
Manufacturer: Sartorius  
Condition: In condition

**Certificate No.:** C01223710  
**Issued Date:** 07 December 2022  
**Job No.:** KSPR2215481  
**Page:** 1 of 2

**Customer:** Water Analysis Center Co., Ltd.  
1/94 Moo 5, Rojana Industrial Park, Rojana Road,  
Tambol Kanham, Amphur U-Thai, Ayutthaya 13210 Thailand

**Environment Condition:** Temperature 25 °C ± 0.9 °C  
Humidity 48 %RH ± 4.9 %RH

**Calibration Place:** Water Analysis Center Co., Ltd. (นิเทศเครื่องชี้)  
1/94 Moo 5, Rojana Industrial Park, Rojana Road,  
Tambol Kanham, Amphur U-Thai, Ayutthaya 13210 Thailand

**Calibration By:** Mr. Pradit Siriboot  
**Calibration Date:** 07 December 2022  
**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. C02221864

*(Signature)*  
(Mr. Pradit Siriboot)  
Person in charge

*(Signature)*  
(Mr. Rungrod Jenkitrakulchai)  
Authorized signatory

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

Small text at the bottom left of the DKSH certificate.

Certificate No.: C01223710

Page: 2 of 2

**Calibration Results:**

**Without Adjustment**

Eccentric 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 (g)	Reference Points (g)				
	A	B	C	D	E
100	-	0.0001	0.0001	-0.0002	-0.0001

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

Nominal test value (g)	Standard Deviation
20	0.00007
200	0.00007

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	0.00012	2.08
2	2.00001	2.0000	0.0000	0.00012	2.08
5	5.00003	5.0000	0.0000	0.00012	2.07
10	10.00002	10.0000	0.0000	0.00013	2.07
20	20.00001	20.0000	0.0000	0.00013	2.08
50	50.00003	50.0000	0.0000	0.00014	2.04
70	70.00004	70.0001	0.0001	0.00017	2.02
100	100.00002	100.0001	0.0001	0.00018	2.01
120	120.00003	120.0001	0.0001	0.00022	2.01
150	150.00005	150.0003	0.0003	0.00024	2.00
200	200.00008	200.0004	0.0003	0.00030	2.00

The End of Certificate

Small text at the bottom right of the DKSH certificate.

**PREVENTATIVE MAINTENANCE (PM) CHECK LIST  
 FOR ATOMIC ABSORPTION SPECTROMETER**

Model & Serial Number: 2402 AA X MY 18230004  
 Customer: Water Analysis Center Co., Ltd.  
 Date: 27 Apr 2023

**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 that external optics surfaces
- ☒ Check Wavelength Accuracy the copper line at 323.0-326.0 nm = 324.6 nm
- ☒ Check that PMT % Gain the copper at 324.8 nm, 4 mA, 0.5 nm slit width, Gain = 39% (should be  $\leq 64\%$  or  $\leq 380V$ )
- ☒ 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 form 7.2-10.6 mL per minute = 9.8 mL/min
- ☒ Test Photometric noise, STDV = 0.0000 Abs (should be  $\leq 0.00050$  Abs)
- ☒ Flame, Test high solids nebulizer setting use
  - Air/acct Cu 5 ppm = 0.85 Abs, and Precision (%RSD) = 0.5 % (should be  $> 0.55$  Abs and  $< 0.5\%$  RSD)
  - or
  - N20/Acct 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 Precision (%RSD) = \_\_\_\_\_ % (should be  $\geq 0.15$  Abs and  $\leq 4.0\%$  RSD)

SIGN :

Engineer : Sungja Nuchanont

Customer : Water Analysis Center Co., Ltd.

2/2

1/2

**PREVENTATIVE MAINTENANCE (PM) CHECK LIST  
 FOR ATOMIC ABSORPTION SPECTROMETER**

Model & Serial Number: 2402 AA X MY 18230004  
 Customer: Water Analysis Center Co., Ltd.  
 Date: 26 Apr 2023

**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 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 that external optics surfaces
- ☒ Check Wavelength Accuracy the copper line at 323.0-326.0 nm = 324.7 nm
- ☒ Check that PMT % Gain the copper at 324.8 nm, 4 mA, 0.5 nm slit width, Gain = 49% (should be  $\leq 64\%$  or  $\leq 380V$ )
- ☐ Flame, Check D2 lamp is work N/A

**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 form 7.2-10.6 mL per minute = \_\_\_\_\_ mL/min N/A
- ☒ Test Photometric noise, STDV = 0.0000 Abs (should be  $\leq 0.00050$  Abs)
- ☐ Flame, Test high solids nebulizer setting use N/A
  - Air/acct Cu 5 ppm = \_\_\_\_\_ Abs, and Precision (%RSD) = \_\_\_\_\_ % (should be  $> 0.55$  Abs and  $< 0.5\%$  RSD)
  - or
  - N20/Acct Cu 5 ppm = \_\_\_\_\_ Abs, and Precision (%RSD) = \_\_\_\_\_ % (should be  $> 0.3$  Abs and  $< 0.5\%$  RSD)
- ☒ Furnace, Characteristic mass and sensitivity Cu 25 ppb = 0.49 Abs, and Precision (%RSD) = 1.7 % (should be  $\geq 0.15$  Abs and  $\leq 4.0\%$  RSD)

SIGN :

Engineer : Sungja Nuchanont

Customer : Water Analysis Center Co., Ltd.

2/2

1/2

## 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.Kanham, A.U.-Thai,  
Phra Nakhon Si Ayutthaya 13210

**Equipment :** Biological Safety Cabinet **Class** II **Type** A2

**Manufacturer :** Microtech

**Model :** V6-T

**Serial No. :** 0972

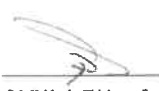
**ID No. :** WWL 0084

**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 Keawkha

**Approved by :**   
(Mr.Kriadsada Thinhutaoei)  
Authorized Signatory

**Issued Date :** 16/10/2023

This calibration certificate documents the traceability to national standards, which realize 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)

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** 0.25-0.50 m/s ( 49-98 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)

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%

Page 4 of 6

**Certificate No. :** M1333/23

### Leak location



**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

- 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
- 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.
- 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.
- 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.

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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**

ระบบ 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	939	932	557
861	1439	1486	765

Remark :

Megafil Co., Ltd.

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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/m<sup>2</sup> when measures at work floor surface.

mW/m <sup>2</sup>			
690	1490	1520	720
440	960	970	430

Remark :

Megafil Co., Ltd.

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

# Certificate of Calibration

## TEMPERATURE CONTROLLER ENCLOSURES



Certificate No.: MC 2213617

Page 1 of 3

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

Reference Job No. : 22-2848 Received Date : 12 December 2022  
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 2213617 ) has been attached to the case.  
Method : In-House calibration procedure MW1-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 : ( 24.3 to 24.6 ) °C  
Relative Humidity : ( 61.4 to 70.1 ) %  
Date of Calibration : 12 December 2022 Date of Issue : 13 December 2022

Checked by : Thanagorn  
Thanagorn Limchaicharon  
(Calibration Supervisor)

Approved by : Aitipong  
Aitipong Kunjanuwat  
(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 2213617

Page 2 of 3

**The Reference Standard :**

Description	Certificate No.	Serial No.	Due date
Date Acquisition/Switch Unit	MC 2208932	MY44012056	8 August 2023

With Thermocouple Type " T " ID. No.11/1 to 11/9

This certificate is traceable to the international system of units maintained at:

- Master Calibration Co., Ltd.

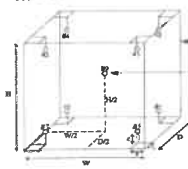
**1. Calibration Procedure:**

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 : 1.7 °C  
Overall Line Voltage variation : 0.0 V  
Chamber Size (W\*H\*D) : 65 cm x 80 cm x 50 cm

Checked by : Thanagorn

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

Certificate No.: MC 2213617

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	35.4	35.3	35.2	35.1	35.0	34.9	34.8	34.9	34.9	0.33

Chamber Characterization Result

Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
35.0	35.0	0.17	0.63	0.8

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 report will certify of the calibrated equipment only.

End of Certificate

Checked by : *Thana*

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

**Certificate of Calibration**

LIQUID BATH



Certificate No.: MC 2213615

Page 1 of 3

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

Reference Job No. : 22-2848 Received Date : 12 December 2022

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 2213615 ) 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 31.9 ) °C

Relative Humidity : ( 46.0 to 52.0 ) %

Date of Calibration : 12 December 2022 Date of Issue : 13 December 2022

Checked by : *Thana*  
Thanagorn Limchaicharoen  
( Calibration Supervisor )

Approved by : *Aitipong*  
Aitipong Kajjansasit  
( 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 2213615

Page 2 of 3

The Reference Standard :

Description : Data Acquisition/Switch Unit  
Certificate No. : MC 2114430  
Serial No. : MY44020009  
Due date : 25 February 2023

With Thermocouple Type " T " ID. No.271 to 275

This certificate is traceable to the international system of units maintained at:

- Master Calibration Co., Ltd.

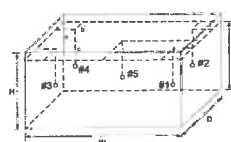
1. Calibration Procedure:

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 : 1.7 °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 : *Thana*

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

Certificate No.: MC 2213615

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	44.5	44.5	44.5	44.6	0.44

Chamber Characterization Result

Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
45.0	45.0	0.84	0.57	1.7

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 report will certify of the calibrated equipment only.

End of Certificate

Checked by : *Thana*

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

# Certificate of Calibration

AUTOClave



Certificate No.: MC 2213616

Page 1 of 3

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

Reference Job No. : 22-2848 Received Date : 12 December 2022  
Description : Autoclave  
Manufacturer : TOMY Model : Autoclave ES-315  
Serial No. : 51135128 ID. No. : WWL0083  
Marking : Additionally for the purpose of identification by this laboratory a label marked with this certificate number ( MC 2213616 ) 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 : ( 49.0 to 52.0 ) %  
Date of Calibration : 12 December 2022 Date of Issue : 13 December 2022

Checked by : Thanagorn Limchaicharon Approved by : Aitipong Kanjanawasit  
( 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 2213616

Page 2 of 3

## The Reference Standard :

Description	Certificate No.	Serial No.	Due date
Temperature Recorder RTD 100 Ohm	MC 2114437	M79251	17 January 2023
Temperature Recorder RTD 100 Ohm	MC 2114435	M79252	17 January 2023
Temperature Recorder RTD 100 Ohm	MC 2114436	S978194	17 January 2023

This certificate is traceable to the international system of units maintained at:

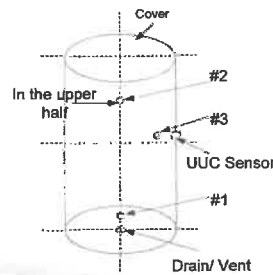
- Master Calibration Co., Ltd.

## 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 : Thanagorn

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

Certificate No.: MC 2213616

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	121.94	122.05	122.02	0.60

### Characterization Result

Setting Temperature (°C)	Timer Setting (min)	Indicating Temperature (°C)	Indicating Pressure (kPa)	Measured Stability (±°C)	Measured Uniformity (°C)	Overall Variation (°C)
121	15.0	121	120	0.42	0.20	0.90

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 report will certify of the calibrated equipment only.

End of Certificate

Checked by : Thanagorn

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

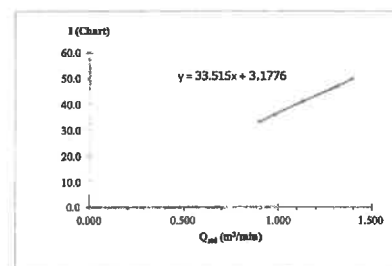
ภาคผนวก ข-9

## High Volume Air Sampler Calibration Worksheet

Page 1 of 1

Project Site :	ศูนย์ปฏิบัติการ/โรงงานอุตสาหกรรม (โรงงาน 4)
Location :	เขตหนอง
Date of measurement :	21/11/2023
Worksheet No. :	C-211113-WWL0093
High Volume ID :	WWL0093
High Volume Model :	TE-5170 (TSP)
High Volume S/N :	2729
Ambient Condition :	
Temperature (°C) :	26
Barometric Pressure (mmHg) :	756
Calibration Office :	
Calibrator ID :	WWL0103
Calibrator Model :	TE-5028A
Calibrator S/N :	3271
Calibrate Date :	13/03/2023
Quality Standard Slope :	1.59945
Quality Standard Intercept :	-0.01874

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



Calibrated by : Mr. TITAWEE WONGMAKKEB

Approved by : Mr. RUNGSASIKORN KOSUM

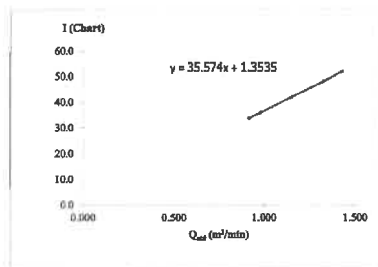
FO.LAB 3.5-125

แก้ไขครั้งที่ : 1 วันที่แก้ไข : 18.1.2560 หน้า : 1 ของ 1

### High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอุตสาหกรรม (โครงการ 4)  
Location : อสม.หนองปรือ  
Date of measurement : 21/11/2023  
Worksheet No. : C-211123-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 <sub>2</sub> O (inch)	Q <sub>std</sub> (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.10	1.418	52.0	51.79	Slope : 35.43 Intercept : 1.348 Correlation Coefficient : 0.9997
2	4.40	1.318	48.0	47.81	
3	3.30	1.143	42.0	41.83	
4	2.40	0.976	36.0	35.85	
5	2.10	0.914	34.0	33.86	



Calibrated by :   
Mr. JITTAWEE WONGMAKHEEB

Approved by :   
Mr. RUNGSASIKORN KOSUM

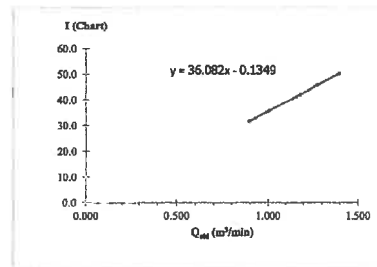
PO.LAB 5.5-1/23

แก้ไขครั้งที่ : 1 วันที่แก้ไข : 1 ต.ค. 2560 หน้า : 1 ของ 1

### High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอุตสาหกรรม (โครงการ 4)  
Location : อสม.หนองปรือ  
Date of measurement : 21/11/2023  
Worksheet No. : C-211123-WWL0095 Calibration Office  
High Volume ID : WWL0095 Calibrator ID : WWL0103  
High Volume Model : TE-5170 (TSP) Calibrator Model : TE-5028A  
High Volume S/N : 2727 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 <sub>2</sub> O (inch)	Q <sub>std</sub> (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	4.90	1.390	50.0	49.80	Slope : 35.94 Intercept : -0.134 Correlation Coefficient : 0.9996
2	4.10	1.273	46.0	45.81	
3	3.50	1.177	42.0	41.83	
4	2.50	0.996	36.0	35.85	
5	2.00	0.892	32.0	31.87	



Calibrated by :   
Mr. JITTAWEE WONGMAKHEEB

Approved by :   
Mr. RUNGSASIKORN KOSUM

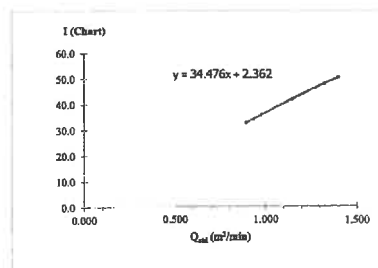
PO.LAB 5.5-1/23

แก้ไขครั้งที่ : 1 วันที่แก้ไข : 1 ต.ค. 2560 หน้า : 1 ของ 1

### High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอุตสาหกรรม (โครงการ 4)  
Location : อสม.หนองปรือ  
Date of measurement : 21/11/2023  
Worksheet No. : C-211123-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 <sub>2</sub> O (inch)	Q <sub>std</sub> (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	4.90	1.390	50.0	49.80	Slope : 34.34 Intercept : 2.352 Correlation Coefficient : 0.9995
2	4.40	1.318	48.0	47.81	
3	3.30	1.143	42.0	41.83	
4	2.40	0.976	36.0	35.85	
5	2.00	0.892	33.0	32.87	



Calibrated by :   
Mr. JITTAWEE WONGMAKHEEB

Approved by :   
Mr. RUNGSASIKORN KOSUM

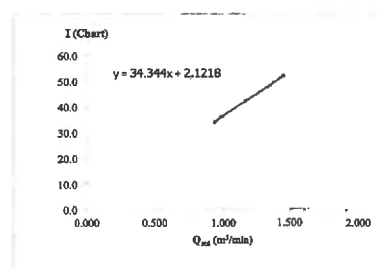
PO.LAB 5.5-1/23

แก้ไขครั้งที่ : 1 วันที่แก้ไข : 1 ต.ค. 2560 หน้า : 1 ของ 1

### High Volume Air Sampler Calibration Worksheet

Project Site : สวนอุตสาหกรรมโรจนะอุตสาหกรรม (โครงการ 4)  
Location : อสม.หนองปรือ  
Date of measurement : 21/11/2023  
Worksheet No. : C-211123-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 <sub>2</sub> O (inch)	Q <sub>std</sub> (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.30	1.445	52.0	51.79	Slope : 34.21 Intercept : 2.113 Correlation Coefficient : 0.9991
2	4.40	1.318	47.0	46.81	
3	3.40	1.160	42.0	41.83	
4	2.40	0.976	36.0	35.85	
5	2.20	0.935	34.0	33.86	



Calibrated by :   
Mr. JITTAWEE WONGMAKHEEB

Approved by :   
Mr. RUNGSASIKORN KOSUM

PO.LAB 5.5-1/23

แก้ไขครั้งที่ : 1 วันที่แก้ไข : 1 ต.ค. 2560 หน้า : 1 ของ 1



บริษัท ศูนย์วิเคราะห์น้ำ จำกัด

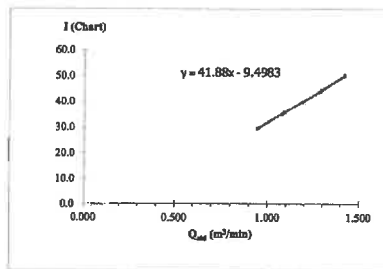
WATER ANALYSIS CENTER COMPANY LIMITED

194 หมู่ 5 ต.สามัคคี อ.อุบล จ.อุบลราชธานี 32110  
194 Moo 5, T.Kasam, A.U-Thai, Ayutthaya 13210, Thailand  
Tel: 0-35226-381, 0-35800-593 Fax: 0-35800-594

### High Volume Air Sampler Calibration Worksheet

Project Site : บริเวณศาลาการปกครอง (โครงการ 4) Page 1 of 1  
Location : วัดบางพลีใหญ่  
Date of measurement : 21/11/2023  
Worksheet No. : C-211123-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 Calibrate Date :  
Temperature (°C) : 26 Quality Standard Slope : 1.00155  
Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01185

Test No.	delta H <sub>2</sub> O (inch)	Q <sub>as</sub> (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 :

Mr. JITTAWEE WONGMAKHEB

Approved by :

Mr. RUNGSASIKORN KOSUM

POLAB 5.5-125

แก้ไขครั้งที่ : วันที่แก้ไข : 1 ธ.ค. 2560 หน้า : 1 ของ 1



บริษัท ศูนย์วิเคราะห์น้ำ จำกัด

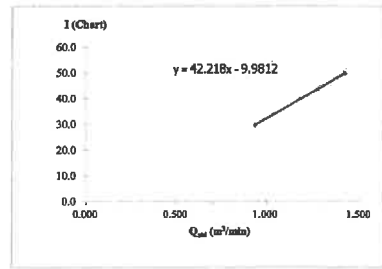
WATER ANALYSIS CENTER COMPANY LIMITED

194 หมู่ 5 ต.สามัคคี อ.อุบล จ.อุบลราชธานี 32110  
194 Moo 5, T.Kasam, A.U-Thai, Ayutthaya 13210, Thailand  
Tel: 0-35226-381, 0-35800-593 Fax: 0-35800-594

### High Volume Air Sampler Calibration Worksheet

Project Site : บริเวณศาลาการปกครอง (โครงการ 4) Page 1 of 1  
Location : วัดบางพลีใหญ่  
Date of measurement : 21/11/2023  
Worksheet No. : C-211123-WWL0099 Calibration Office  
High Volume ID : WWL0099 Calibrator ID : WWL0103  
High Volume Model : TE-6070 (PM10) Calibrator Model : TE-5028A  
High Volume S/N : 2732 Calibrator S/N : 3271  
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 <sub>2</sub> O (inch)	Q <sub>as</sub> (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.00	1.416	50.0	31.44	Slope : 26.55 Intercept : -6.277 Correlation Coefficient : 0.9998
2	4.10	1.283	44.0	27.67	
3	3.50	1.186	40.0	25.15	
4	2.70	1.044	34.0	21.38	
5	2.20	0.943	30.0	18.87	



Calibrated by :

Mr. JITTAWEE WONGMAKHEB

Approved by :

Mr. RUNGSASIKORN KOSUM

POLAB 5.5-125

แก้ไขครั้งที่ : วันที่แก้ไข : 1 ธ.ค. 2560 หน้า : 1 ของ 1



บริษัท ศูนย์วิเคราะห์น้ำ จำกัด

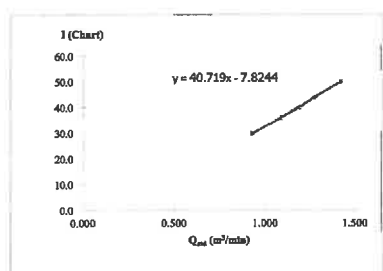
WATER ANALYSIS CENTER COMPANY LIMITED

194 หมู่ 5 ต.สามัคคี อ.อุบล จ.อุบลราชธานี 32110  
194 Moo 5, T.Kasam, A.U-Thai, Ayutthaya 13210, Thailand  
Tel: 0-35226-381, 0-35800-593 Fax: 0-35800-594

### High Volume Air Sampler Calibration Worksheet

Project Site : บริเวณศาลาการปกครอง (โครงการ 4) Page 1 of 1  
Location : วัดบางพลีใหญ่  
Date of measurement : 21/11/2023  
Worksheet No. : C-211123-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 Calibrate Date :  
Temperature (°C) : 26 Quality Standard Slope : 1.00155  
Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01185

Test No.	delta H <sub>2</sub> O (inch)	Q <sub>as</sub> (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.00	1.416	50.0	31.44	Slope : 25.61 Intercept : -4.920 Correlation Coefficient : 0.9991
2	4.00	1.268	44.0	27.67	
3	3.50	1.185	40.0	25.15	
4	2.90	1.081	36.0	22.64	
5	2.10	0.922	30.0	18.87	



Calibrated by :

Mr. JITTAWEE WONGMAKHEB

Approved by :

Mr. RUNGSASIKORN KOSUM

POLAB 5.5-121

แก้ไขครั้งที่ : วันที่แก้ไข : 1 ธ.ค. 2560 หน้า : 1 ของ 1



บริษัท ศูนย์วิเคราะห์น้ำ จำกัด

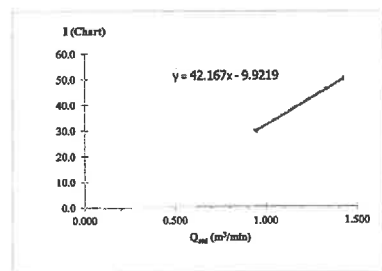
WATER ANALYSIS CENTER COMPANY LIMITED

194 หมู่ 5 ต.สามัคคี อ.อุบล จ.อุบลราชธานี 32110  
194 Moo 5, T.Kasam, A.U-Thai, Ayutthaya 13210, Thailand  
Tel: 0-35226-381, 0-35800-593 Fax: 0-35800-594

### High Volume Air Sampler Calibration Worksheet

Project Site : บริเวณศาลาการปกครอง (โครงการ 4) Page 1 of 1  
Location : วัดบางพลีใหญ่  
Date of measurement : 21/11/2023  
Worksheet No. : C-211123-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 Calibrate Date :  
Temperature (°C) : 26 Quality Standard Slope : 1.00155  
Barometric Pressure (mmHg) : 756 Quality Standard Intercept : -0.01185

Test No.	delta H <sub>2</sub> O (inch)	Q <sub>as</sub> (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.00	1.416	50.0	31.44	Slope : 26.52 Intercept : -6.239 Correlation Coefficient : 0.9998
2	4.40	1.329	46.0	28.93	
3	3.80	1.236	42.0	26.41	
4	2.70	1.044	34.0	21.38	
5	2.20	0.943	30.0	18.87	



Calibrated by :

Mr. JITTAWEE WONGMAKHEB

Approved by :

Mr. RUNGSASIKORN KOSUM

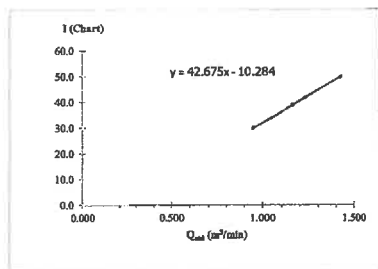
POLAB 5.5-121

แก้ไขครั้งที่ : วันที่แก้ไข : 1 ธ.ค. 2560 หน้า : 1 ของ 1

# High Volume Air Sampler Calibration Worksheet

Project Site : กรมควบคุมมลพิษ (โครงการ 4)  
Location : ที่กองยานทางพิเศษนอกเขตโครงการ (AS)  
Date of measurement : 21/11/2023  
Worksheet No. : C-211123-WWL0102  
High Volume ID : WWL0102  
High Volume Model : TE-6670 (PM10)  
High Volume S/N : 2731  
Ambient Condition :  
Temperature (°C) : 26  
Barometric Pressure (mmHg) : 756  
Calibration Office :  
Calibrator ID : WWL0103  
Calibrator Model : TE-5028A  
Calibrator S/N : 3271  
Calibrate Date : 13/03/2023  
Quality Standard Slope : 1.00155  
Quality Standard Intercept : -0.01185

Test No.	delta H <sub>2</sub> O (inch)	Q <sub>std</sub> (m³/min)	I (Chart)	IC (Corrected)	Linear Regression
1	5.00	1.416	50.0	31.44	Slope : 26.84 Intercept : -6.467 Correlation Coefficient : 0.9997
2	3.70	1.220	42.0	26.41	
3	3.30	1.152	39.0	24.52	
4	2.70	1.044	34.0	21.38	
5	2.20	0.943	30.0	18.87	



Calibrated by :

Mr. JITTAWEE WONGMAKHEB

Approved by :

Mr. RUNGSAKORN KOSUM

PO.LAB 5.5-1/3

วันที่รับ : วันที่ส่งคืน : 11 มี.ค. 2566 หน้า : 1 ของ 1

Jiranatee Associates Co., Ltd.  
63/14-15, 67/35-36  
Pachabaim 7/12, Rd. Watthapong, Bangkok  
Bangkok 10600 (Thailand)  
Tel: +6628080812  
Mobile: +6628080813  
E-mail: jaso-calibration@jiranatee.com  
Web site: www.jiranatee.com

## CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM : Wind Direction Sensor  
MANUFACTURER : Novolyte  
MODEL/TYPE : Sensor: WS-02F  
Data logger: 200-WS-25LB  
SERIAL NUMBER : Sensor: KS-040  
Data logger: AS040  
ID NUMBER :  
CONDITION AS-RECEIVED :  
CUSTOMER : Used Item  
Water Analysis Center Co., Ltd.  
94/1 Moo 5, T.Janham, 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 follows:  
Temperature : 23.0 ± 3.0 °C  
Relative Humidity : 55.0 ± 15.0 %RH  
Atmospheric Pressure : 1010 ± 10 hPa

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

CALIBRATION CONDITION : Wind tunnel cross-section area<sup>1</sup> : 900 cm²  
Win direction frontal area<sup>2</sup> : 129 cm²  
Diameter of mounting pipe<sup>3</sup> : mm  
Blockage ratio of test object<sup>4</sup> : 0.143 [-]

Preconditioning : 24 hours at ambient conditions.  
Measurement Condition : The average values during measurement are 23.8°C, 41.3 %RH and 1013.3 hPa.

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

Calibrated by :  
Mr. Sorawit Thechadit  
Mr. Jiraporn Lerthomphol

Remarks:  
<sup>1</sup> Nozzle cross-section area of the wind tunnel  
<sup>2</sup> Projected cross-section area of the tested object include mounting pipe  
<sup>3</sup> Diameter of mounting pipe  
<sup>4</sup> Ratio =  $\frac{A_2}{A_1}$

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

Jiranatee Associates Co., Ltd.  
63/14-15, 67/35-36  
Pachabaim 7/12, Rd. Watthapong, Bangkok  
Bangkok 10600 (Thailand)  
Tel: +6628080812  
Mobile: +6628080813  
E-mail: jaso-calibration@jiranatee.com  
Web site: www.jiranatee.com

## CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM : Cup anemometer  
MANUFACTURER : Novolyte  
MODEL/TYPE : Sensor: WS-02F  
Data logger: 200-WS-25LB  
SERIAL NUMBER : Sensor: KS-040  
Data logger: AS040  
ID NUMBER :  
CONDITION AS-RECEIVED :  
CUSTOMER : Used Item  
Water Analysis Center Co., Ltd.  
94/1 Moo 5, T.Janham, 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 follows:  
Temperature : 23.0 ± 3.0 °C  
Relative Humidity : 55.0 ± 15.0 %RH  
Atmospheric Pressure : 1010 ± 10 hPa

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

CALIBRATION CONDITIONS : Wind tunnel cross-section area<sup>1</sup> : 900 cm²  
Win direction frontal area<sup>2</sup> : 100 cm²  
Diameter of mounting pipe<sup>3</sup> : mm  
Blockage ratio of test object<sup>4</sup> : 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 Thechadit  
Mr. Jiraporn Lerthomphol

Remarks:  
<sup>1</sup> Nozzle cross-section area of the wind tunnel  
<sup>2</sup> Projected cross-section area of the tested object include mounting pipe  
<sup>3</sup> Diameter of mounting pipe  
<sup>4</sup> Ratio =  $\frac{A_2}{A_1}$

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

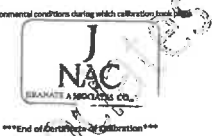
Page 2 of 2 Pages

### MEASUREMENT RESULTS<sup>1</sup>

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° <sub>std</sub> Degree (°)	D° <sub>mea</sub> Degree (°)	Error Degree (°)	U (k=2) Degree (°)
5.05	45.000	41	-4	1.0
	90.000	87	-3	1.0
	135.000	133	-2	1.0
	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:  
<sup>1</sup> Calibration results only count for the tested circumstances and environmental conditions during which calibration has been made.  
<sup>2</sup> Direction of standard  
<sup>3</sup> Direction of Unit Under Calibration



Certificate Number

CL-026-66

Certificate Number

CL-026-66

#### MEASUREMENT RESULTS<sup>5</sup>

The cup anemometer, Unit Under Calibration (UUC) was exercised at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer and above 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure meter which was purged 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 <sub>ref</sub> (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V <sub>uuc</sub> (m/s)	Error (m/s)	u <sub>c</sub> (m/s)
1.037	24.24	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
4.217	24.70	24.45	4.0	-0.2	0.31
5.02	24.40	24.45	4.9	-0.1	0.31
5.89	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	-0.1	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	0.31
13.18	24.50	24.45	13.1	-0.1	0.31
14.24	24.40	24.45	14.1	-0.1	0.31
15.22	24.40	24.45	15.0	-0.3	0.31
16.27	24.40	24.45	16.1	-0.2	0.41

#### Remarks

<sup>5</sup> Calibration results only exist for the tested circumstances and environmental conditions during which calibration took place

<sup>6</sup> Velocity of standard

<sup>7</sup> Velocity of Unit Under Calibration

#### PHOTO OF CALIBRATION SET-UP



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



W	FOJ.LAB 6-4-1/28	แก้ไขครั้งที่ : 0	วันที่บังคับใช้ : 1 ม.ค. 2562	หน้า : 1 ของ 1
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#### แบบบันทึกการทวนสอบเครื่อง Sound Level Meter

เครื่อง CA111 Sound Calibrator S/N 520272	รหัสเครื่องมือ SR004	เกณฑ์การยอมรับ 93.78 ± 0.3, 113.84 ± 0.3
วันที่สอบเทียบ 15/05/66	วันที่สอบเทียบครั้งต่อไป 14/05/67	
เครื่อง Digital Thermohygrometer S/N AP-08264	รหัสเครื่องมือ PWWL 0028	
วันที่สอบเทียบ 14/03/66	วันที่สอบเทียบครั้งต่อไป 013/03/67	
เครื่อง Sound Level Meter S/N 00396803	รหัสเครื่องมือ PWWL 0160	
วันที่สอบเทียบ 31/05/66	วันที่สอบเทียบครั้งต่อไป 30/05/68	

#### การทวนสอบก่อนออกให้ใช้งาน

อุณหภูมิ (°C) 24	เกณฑ์การยอมรับ 23.0 ± 3.0
ความชื้นสัมพัทธ์ (%) 46	เกณฑ์การยอมรับ 50.0 ± 15.0
วันที่ทวนสอบ 27/11/66	

#### การทวนสอบหลังจากออกให้ใช้งาน

อุณหภูมิ (°C) 24	เกณฑ์การยอมรับ 23.0 ± 3.0
ความชื้นสัมพัทธ์ (%) 46	เกณฑ์การยอมรับ 50.0 ± 15.0
วันที่ทวนสอบ 27/11/66	

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	113.9	1	93.8	113.9
2	93.8	113.9	2	93.8	113.9
3	93.8	113.9	3	93.8	113.9
4	93.8	113.9	4	93.8	113.9
5	93.8	113.9	5	93.8	113.9
6	93.8	113.9	6	93.8	113.9
7	93.8	113.9	7	93.8	113.9
8	93.8	113.9	8	93.8	113.9
9	93.8	113.9	9	93.8	113.9
10	93.8	113.9	10	93.8	113.9
X	93.80	113.90	X	93.80	113.90
SD	0.00	0.00	SD	0.00	0.00
%RSD (≤ 10)	0.00	0.00	%RSD (≤ 10)	0.00	0.00
ผลการ ทวนสอบ	ผ่าน	ผ่าน	ผลการ ทวนสอบ	ผ่าน	ผ่าน

ผู้บันทึก 20/11/66  
ผู้ตรวจสอบ

ผู้บันทึก 20/11/66  
ผู้ตรวจสอบ

W	FOJ.LAB 6-4-1/28	แก้ไขครั้งที่ : 0	วันที่บังคับใช้ : 1 ม.ค. 2562	หน้า : 1 ของ 1
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#### แบบบันทึกการทวนสอบเครื่อง Sound Level Meter

เครื่อง CA111 Sound Calibrator S/N 520272	รหัสเครื่องมือ SR004	เกณฑ์การยอมรับ 93.77 ± 0.3, 113.84 ± 0.3
วันที่สอบเทียบ 15/05/66	วันที่สอบเทียบครั้งต่อไป 14/05/67	
เครื่อง Digital Thermohygrometer S/N AP-08264	รหัสเครื่องมือ PWWL 0028	
วันที่สอบเทียบ 14/03/66	วันที่สอบเทียบครั้งต่อไป 013/03/67	
เครื่อง Sound Level Meter S/N 00396803	รหัสเครื่องมือ PWWL 0161	
วันที่สอบเทียบ 31/05/66	วันที่สอบเทียบครั้งต่อไป 30/05/68	

#### การทวนสอบก่อนออกให้ใช้งาน

อุณหภูมิ (°C) 24	เกณฑ์การยอมรับ 23.0 ± 3.0
ความชื้นสัมพัทธ์ (%) 46	เกณฑ์การยอมรับ 50.0 ± 15.0
วันที่ทวนสอบ 21/11/66	

#### การทวนสอบหลังจากออกให้ใช้งาน

อุณหภูมิ (°C) 24	เกณฑ์การยอมรับ 23.0 ± 3.0
ความชื้นสัมพัทธ์ (%) 51	เกณฑ์การยอมรับ 50.0 ± 15.0
วันที่ทวนสอบ 29/11/66	

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
ผลการ ทวนสอบ	ผ่าน	ผ่าน	ผลการ ทวนสอบ	ผ่าน	ผ่าน

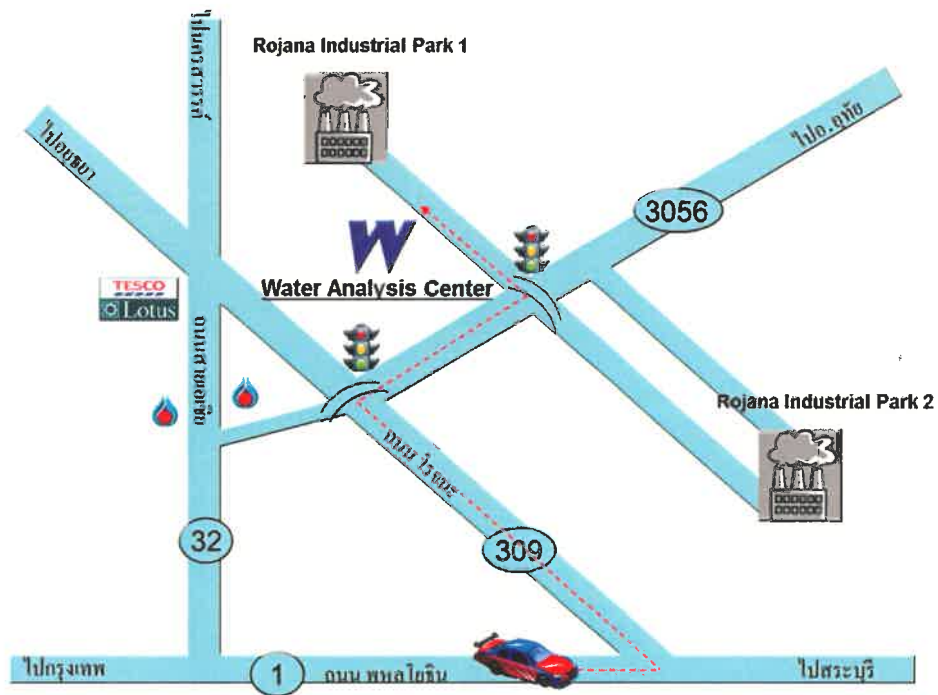
ผู้บันทึก 20/11/66  
ผู้ตรวจสอบ

ผู้บันทึก 20/11/66  
ผู้ตรวจสอบ









บริษัท ศูนย์วิเคราะห์น้ำ จำกัด

1/94 หมู่ที่ 5 ต.คานหาม อ.อุทัย จ.พระนครศรีอยุธยา 13210

โทรศัพท์ 035-800593, 081-9917119 โทรสาร 035-800594

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