

ภาคผนวก ค : เอกสารสอบเทียบความถูกต้อง  
ของเครื่องมือเก็บตัวอย่าง

## **ANALYTICAL BALANCE**

**Model : MS204TS/00**

**Serial No. : B904136539**

Mettler-Toledo (Thailand) Ltd.  
846/4 - 846/5 Lasalle Rd., Bangna Tai Sub-District  
Bangna District, Bangkok 10260  
+66 2723 0382  
MT-TH ServiceSupport@mt.com



NSC-115-115 17025  
CALIBRATION 0062

## Accuracy Calibration Certificate

### Customer

Company: EASTERN THAI CONSULTING 1992 CO., LTD.  
Address: 683 Moo 11, Sukhaphiban 8 Rd., Nong Kham  
City: Sriracha Contact: Sasiporn N.  
Zip / Postal: 20230  
State / Province: Chonburi  
Order Number: 033988060

### Weighing Device

Manufacturer: Mettler Toledo  
Model: MS204TS/00  
Serial No.: B904136539  
Building: Laboratory  
Floor: 1  
Room: Balance  
Instrument Type: Weighing Instrument  
Asset Number: LABE 05/4  
Terminal Model: N/A  
Terminal Serial No.: N/A  
Terminal Asset No.: N/A

Range	Max. Capacity	Readability (g)
1	220 g	0.0001 g

### Procedure

Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)  
Mettler Toledo Work Instruction: CPW002/20  
This calibration certificate contains measurements for As Found and As Left calibrations.  
The sensitivity/span of the weighing instrument was adjusted before As Found and As Left calibrations with a built-in weight.  
In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

	Temperature		Humidity	
	As Found	As Left	As Found	As Left
	Start: 23.4 °C	End: 23.4 °C	Start: 50.6 %	End: 50.6 %
	Start: 23.8 °C	End: 23.4 °C	Start: 51.8 %	End: 51.2 %

As Found Calibration Date: 05-Feb-2024  
As Left Calibration Date: 05-Feb-2024  
Issue Date: 05-Feb-2024  
Calibrator: Sathaporn Tabson  
Approved Signatory: Sathaporn Tabson

Technical Manager / Head of Calibration Center



## Measurement Results

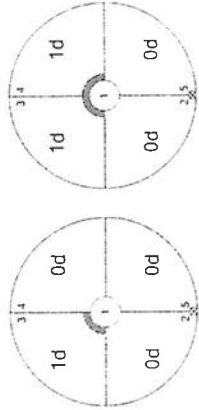
### Repeatability

Test Load: 100 g		As Found	As Left
1	99.9996 g	100.0001 g	As Found
2	99.9997 g	100.0001 g	As Left
3	99.9997 g	100.0000 g	As Found
4	99.9996 g	100.0001 g	As Left
5	99.9997 g	100.0001 g	As Found
6	99.9996 g	100.0000 g	As Left
7	99.9997 g	100.0001 g	As Found
8	99.9996 g	100.0000 g	As Left
9	99.9996 g	100.0001 g	As Found
10	99.9996 g	100.0001 g	As Left
Standard Deviation		0.00005 g	

The "g" in the graph represents the readability of the range/interval in which the test was performed.  
The results of this graph are based upon the absolute values of the differences from the mean value.

### Eccentricity

Test Load: 100 g		Position	As Found	As Left
1	99.9996 g	100.0000 g	As Found	As Left
2	99.9996 g	100.0000 g	As Found	As Left
3	99.9997 g	100.0001 g	As Found	As Left
4	99.9996 g	100.0001 g	As Found	As Left
5	99.9996 g	100.0000 g	As Found	As Left
Maximum Deviation		0.0001 g		



The "d" in the graph represents the readability of the range/interval in which the test was performed.



Error of Indication

As Found	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.12 mg	2
2	0.0100 g	0.0100 g	0.0000 g	0.13 mg	2
3	0.0500 g	0.0499 g	-0.0001 g	0.13 mg	2
4	0.1000 g	0.0998 g	-0.0001 g	0.13 mg	2
5	1.0000 g	0.9999 g	-0.0001 g	0.13 mg	2
6	5.0000 g	4.9999 g	-0.0001 g	0.14 mg	2
7	10.0000 g	9.9999 g	-0.0001 g	0.14 mg	2
8	50.0000 g	49.9997 g	-0.0003 g	0.16 mg	2
9	100.0000 g	99.9995 g	-0.0005 g	0.20 mg	2
10 <sup>1</sup>	149.9999 g	149.9993 g	-0.0006 g	0.31 mg	2
11 <sup>1</sup>	199.9998 g	199.9990 g	-0.0008 g	0.35 mg	2

As Left

Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.11 mg	2
2	0.0100 g	0.0100 g	0.13 mg	2
3	0.0500 g	0.0500 g	0.13 mg	2
4	0.1000 g	0.1000 g	0.13 mg	2
5	1.0000 g	1.0001 g	0.13 mg	2
6	5.0000 g	5.0000 g	0.13 mg	2
7	10.0000 g	10.0001 g	0.14 mg	2
8	50.0000 g	50.0001 g	0.15 mg	2
9 <sup>1</sup>	100.0000 g	100.0001 g	0.20 mg	2
10 <sup>1</sup>	149.9999 g	150.0000 g	0.31 mg	2
11 <sup>1</sup>	199.9998 g	199.9999 g	0.35 mg	2

<sup>1</sup>The calculated uncertainty was replaced by the CMC (Calibration and Measurement Capabilities) value because the calculated uncertainty was smaller than the CMC value.

As Found

◆ As Left



For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

Calibration Points [g]

The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor  $k$  – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The results of this calibration certificate relate only to the calibrated item.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2

Weight Set No.: WS32  
Certificate Number: 188109  
Date of Issue: 25-Sep-2023  
Calibration Due Date: 25-Mar-2025

Weight Set 2: OIML E2

Weight Set No.: WS85  
Certificate Number: 188113  
Date of Issue: 27-Sep-2023  
Calibration Due Date: 26-Mar-2025

Thermo Baro Hygrometer

Equipment No.: IN74  
Certificate Number: SG-H-00418/66  
Date of Issue: 19-May-2023  
Calibration Due Date: 18-May-2024

Remarks

FACT adjustment functionality activated  
Equipment condition: Good  
Next calibration according to customer's procedure  
Calibration data not decide by calibration laboratory

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

COPY

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with  $k=2$  in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value  $R$  represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use:  $1.5 \cdot 10^{-6} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: 5 K

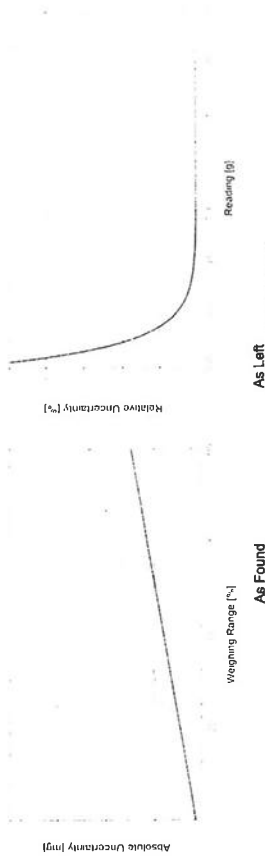
Linearization of Uncertainty Equation

	Range	d	Max	As Found	As Left
1	0.0001 g	220 g		$U_1 = 0.13 \text{ mg} + 0.0101 \text{ mg/g} \cdot R$	$U_1 = 0.13 \text{ mg} + 0.00616 \text{ mg/g} \cdot R$

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication	As Found	As Left
0.0220 g	0.13 mg	0.13 mg
0.2200 g	0.13 mg	0.13 mg
2.2000 g	0.15 mg	0.14 mg
22.0000 g	0.35 mg	0.27 mg
220.0000 g	2.4 mg	1.5 mg



GWP®  
Certificate



As Found ✓ As Left ✓

The weighing device meets the given process requirements.

The weighing device meets the given process requirements.

Tests Performed: As Found As Left

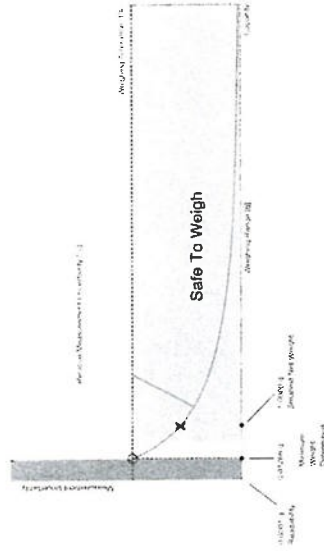
Process Requirements

Weighing Tolerance: 1%

Smallest Net Weight: 1.0000 g

Safety Factor: 2

Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. This graph reflects As Left testing, unless only As Found was performed.

## Minimum Weight

### As Found Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
Safety Factor					
Tolerance	1	2	3	5	10
0.1%	0.13300 g	0.26873 g	0.40728 g	0.69320 g	1.46405 g
0.2%	0.06616 g	0.13300 g	0.20051 g	0.33764 g	0.69320 g
0.5%	0.02638 g	0.05288 g	0.07947 g	0.13300 g	0.26873 g
1%	0.01318 g	0.02638 g	0.03962 g	0.06616 g	0.13300 g
2%	0.00659 g	0.01318 g	0.01978 g	0.03300 g	0.06616 g
5%	0.00283 g	0.00527 g	0.00790 g	0.01318 g	0.02638 g

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

### As Left Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
Safety Factor					
Tolerance	1	2	3	5	10
0.1%	0.12728 g	0.25614 g	0.38662 g	0.65256 g	1.34797 g
0.2%	0.06344 g	0.12728 g	0.19151 g	0.32118 g	0.55256 g
0.5%	0.02533 g	0.05072 g	0.07618 g	0.12728 g	0.25614 g
1%	0.01266 g	0.02533 g	0.03802 g	0.06344 g	0.12728 g
2%	0.00633 g	0.01266 g	0.01899 g	0.03167 g	0.06344 g
5%	0.00253 g	0.00506 g	0.00759 g	0.01266 g	0.02533 g

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with  $k = 2$  and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

## Measurement Results

### Results Summary

Repeatability			
As Found	As Left	Eccentricity	Error of Indication
✓	✓	✓	✓

✓ = Passed  
✗ = Failed  
N/A = Safety Factor not met

### Repeatability

Test Load: 100 g

Tolerance		Control Limit	As Found		As Left	
			Std. Deviation	Result	Std. Deviation	Result
0.1%		0.00050 g		✓		✓
0.2%		0.00100 g		✓		✓
0.5%		0.00250 g		✓		✓
1%		0.00500 g	0.00005 g	✓	0.00005 g	✓
2%		0.01000 g		✓		✓
5%		0.02500 g		✓		✓

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

### Eccentricity

Test Load: 100 g

Tolerance		Control Limit	As Found		As Left	
			Deviation	Result	Deviation	Result
0.1%		0.0500 g		✓		✓
0.2%		0.1000 g		✓		✓
0.5%		0.2500 g		✓		✓
1%		0.5000 g	0.0001 g	✓	0.0001 g	✓
2%		1.0000 g		✓		✓
5%		2.5000 g		✓		✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

As Found

		Control limits for various weighing tolerances							
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%		
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A		
50.0000 g	-0.0003 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g		
100.0000 g	-0.0005 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g		
149.9999 g	-0.0006 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g		
199.9998 g	-0.0008 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g		
Result		✓	✓	✓	✓	✓	✓		

As Left

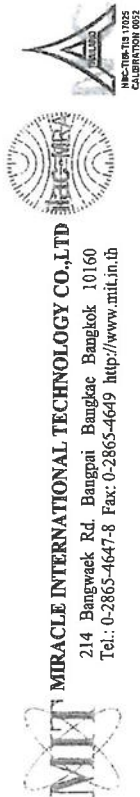
		Control limits for various weighing tolerances							
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%		
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A		
50.0000 g	0.0001 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g		
100.0000 g	0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g		
149.9999 g	0.0001 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g		
199.9998 g	0.0001 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g		
Result		✓	✓	✓	✓	✓	✓		

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

## **BAROMETER**

**Equipment : Analog Barometer**

**ID No. / Tag No. : BM001/41**



## CALIBRATION CERTIFICATE



Certificate No. : L202305085-002  
Date Issued : 16-May-23

**Customer** : Eastern Thai Consulting 1992 Co., Ltd.  
683 Moo 11 Sukhaphibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

**Equipment** : Analog Barometer

**Manufacturer** : Barigo  
**Model** : -  
**Serial No.** : -  
**ID No./Tag No.** : BM001/41  
**Date Received** : 11-May-23  
**Date Calibrated** : 15-May-23

**Calibrated by** : Mr. Jame Khaothong

Calibration Method or Calibration Procedure Used

In-house method : CP-21 base on DKD-R 6-1: Edition 3 2014.

This certificate is traceable to national standards; which realize the units of measurement according to the International System of Units (SI).

### Result of Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level confidence approximately 95 percent.

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

Approved by:   
( Mr. Sarayuth Tochua )



Page 1 of 2

**COPY**

Certificate No : L202305085-002  
**Environment** : Ambient Temperature : (25 ± 2)°C  
Relative Humidity : (50 ± 15)%RH

STD Reading mbar	UUC Reading (mbar) Before Adjusted	UUC Reading (mbar) After Adjusted	UUC Error mbar	Uncertainty ± mbar
990.00	990.0	-	0.00	0.61
1000.00	1000.0	-	0.00	0.61
1010.00	1010.0	-	0.00	0.61
1020.00	1020.0	-	0.00	0.61
1030.00	1030.0	-	0.00	0.61

STD = Standard

UUC = Unit Under Calibration

**Calibrated condition :** Pressure Medium : Air : Density = 1.19 kg/m<sup>3</sup> @ 20°C, 1 bar  
Mounting Position : Vertical  
Reference Level : at center of its dial  
Conversion Factor : Multiply by 1.0 E+02 - Pa unit

**Description of UUC :**

Range : 990 - 1030 mbar Absolute  
Calibration Range : 990 - 1030 mbar Absolute  
Scale Interval : 1 mbar  
Resolution : 0.5 mbar Absolute

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

**Measurement Standards Used & Traceability :**

The International System of Units (SI) through

IRPC Certificate No. CL1-P220104 for Reference Pressure Monitor Serial No. 1598, Due 11-Nov-23

End of Certificate

Page 2 of 2

**COPY**

**Hot Air Oven**

**Model : UFE 500**

**Serial No. : G511.0182**

### Results of Calibration

Resolution : 0.5 °C

#### 1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C) reading (°C)	UUC*	Measured temperature at each positions (°C)										Uncertainty ± (°C)	Coverage factor k
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9 <sup>out</sup>	# 10		
104	103.5	103.5	104.11	103.911	103.84	103.84	103.97	103.93	103.64	103.51	104.23	104.23	0.47	2.00

#### 2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
104	0.04	0.78	0.81

#### Notes

UUC\* = Unit Under Calibration

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.

683 Moo 11, Sukhaphiban 8 Rd., Nongkham,

Siracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.

(Hot Lab)

Equipment : Temperature controlled enclosures (Hot air oven)

Manufacturer : Marmert

Model : UFE 500

ID No. : LABE 17/4

Date of Receipt : 22 December 2023

Date of Calibration : 22 December 2023

#### Condition of Calibration

1. Environment : 1.1 Ambient temperature : Maximum 30.9 °C : Minimum 29.6 °C

: 1.2 Relative humidity : Maximum 54.5 % : Minimum 45.8 %

: 1.3 Line voltage supplied : Maximum 227.6 VAC : Minimum 224.2 VAC

#### 2. Calibration method

TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

#### 3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
------------	--------	-----------------	----------

Data Acquisition With Sensor (RTD-PT100)	LB-DA-08 (RTD-248 to RTD-256)	23-084070	06 August 2024
------------------------------------------	-------------------------------	-----------	----------------

4. This certificate is traceable to the international system of unit (SI Unit).

The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

5. This result of calibration was found accurate as shown on date and place of calibration only.

6. Condition of calibration item : Normal

Calibrated by

Mr. Pisek Into

Scientist

25 December 2023

Approved by

(Mr. Somchai Neampunt)

Signed for Director

Issue date

25 December 2023

The uncertainties are for a confidence probability of approximately 95%.  
The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.  
This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

361 Soi Ladprao 122, Ladprao Road,  
Phlabphla, Wang Thonglang, Bangkok 10310

TEL 02-516-2422  
FAX 02-516-6949  
Rev 01

CONTACT@AMARC.CO.TH  
WWW.AMARC.CO.TH  
Effective Date 15/10/21

361 Soi Ladprao 122, Ladprao Road,  
Phlabphla, Wang Thonglang, Bangkok 10310

TEL 02-516-2422  
FAX 02-516-6949  
Rev 09

CONTACT@AMARC.CO.TH  
WWW.AMARC.CO.TH  
Effective Date 15/10/21

COPY

## REPORT OF CALIBRATION

Page 3 of 3  
Certificate No. : 23-148804  
Sample Code : 23-56200-006

### Results of Calibration

#### Notes

1. Sensor installation locations
  - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
  - 1.2 The reference sensor is preferably located at the geometric center of the chamber.
2. Interior dimensions approx of chamber :  
W = 56 cm ; D = 40 cm ; H = 48 cm
3. Air valve or fresh air level : Off
4. Fan level : Open
5. The quoted uncertainty includes "Stability of chamber and loading effect in chamber at 20% of uniformity".
6. 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.
7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.
8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.
9. UUC\* reading - the average reading of indicating device that forms the integral part of the enclosure
10. Calibration results without adjustment.

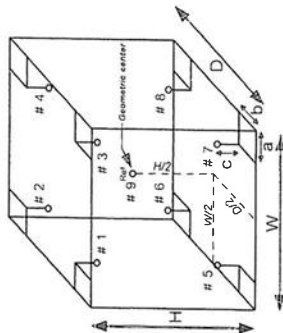


Figure: Example of sensor  
Installation Positions

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS MD003

End of Report

**COPY**

**IC-THERMO**

**Serial No. : 20053176**

ค-13

# **INDUCTIBELY COUPLED PLASMA SPECTROMETER**

**Model : Prodigy 7**

**Serial No. : P70177**



## Instrument Performance Certificate

For ICP-OES

PRODUCT ID  
Serial Number

Prodigy 7, Teledyne Leeman Labs  
P70177

Customer Name  
Address

EASTERN THAI CONSULTING 1992 CO., LTD.  
999 Moo 11 Tambon Nong Kham, Amphoe Si Racha,  
Chonburi 20230

Date of Qualified  
Next Due date

Dec 13, 2023  
May 13, 2024

This certifies for products which was performed in acceptable criteria specifications

Gas supply /Water chiller/Exhaust hood  
Cooling Systems  
Spectrometer

RF Generator

Sample Introduction & Autosampler

Software & Computer

Hardware Diagnostics Test

Analytical Test

Provided by

Scientist Instrument Co., Ltd.  
113 Soi Ekachai 44, Ekachai Road  
Khlong Bang Phran, Bangkok  
Bangkok 10150 Thailand

Certified by

Thunraphol Sakdayos

Service Engineer

COPY



## Preventive Maintenance Report

Customer Name:	Eastern Thai Consulting 1992 Co., Ltd	Date: Dec 13, 2023
Instrument/Equipment:	ICP-OES	Model: Prodigy 7
Brand:	Teledyne Leeman Labs	S/N: P70177


1. Gas Supply / Water Chiller / Exhaust Hood:	Status
Gas systems:	
Argon Pressure (85-95 psi): 96 psi	OK
Nitrogen Pressure (85-95 psi): - psi	OK
No leak inspected	OK
Replace camera purge gas Dehydrator	OK
Water Chiller for RF generator	
Minimum flowrate detected	OK
No leak inspected	OK
Water Chiller for Detector	
Check water level and refill	OK
Change water	OK
Temperature: 25 °C	OK
Exhaust Hood:	
Minimum Air flowrate checked	OK

2. Spectrometer	Status
Optical view position	
Axial peak positions x 3325 y 1305	OK
Radial peak positions x 4206 y 1220	OK
Hg lamp peak positions x 2245 y 2115	OK
Wavelength Calibrate with HG Lamp	OK
Full Frame Image	OK
Temperature controlled 31 °C	OK
Purge gas flow control Low/High	OK
Purge gas flow for Detector	OK
Camera Support Module	OK

Engineer Sign

COPY

<b>3.RF Generator</b>	
Plasma Control	Status
Auto Start	OK ✓
Extinguish	OK ✓
RF power setting	OK ✓
Igniter	OK ✓
Air Knife	OK ✓
Coolant/Plasma Flow control	OK ✓
Aux Flow	OK ✓
Optimize sample introduction function	OK ✓
<b>4.Sample Introduction &amp; Autosampler</b>	
Plasma torch	Status
Plasma Torch	OK ✓
Spray chamber	OK ✓
Injector	OK ✓
Nebulizer pressure	OK ✓
Peristaltic pump and control	
Speed control	OK ✓
Sample tubing	OK ✓
Drain tubing	OK ✓
Autosampler Control	<input type="checkbox"/> Available <input checked="" type="checkbox"/> Not Available
Position movement	OK <input type="checkbox"/>
Drain tubing	OK <input type="checkbox"/>
Auto Rinse	OK <input type="checkbox"/>
<b>5.Computer &amp; Software Check:</b>	
Interface Cable USB	Status
Software Version 5.2	OK ✓
Operation function check :	OK ✓
Open /Save /Edit method	OK ✓
Instrument Control	OK ✓
Sequence	OK ✓
Full Frame Capture	OK ✓
Auto alignment /Hg alignment	OK ✓
Calibration Curve	OK ✓
Re-Calculation	OK ✓
Print Report	OK <input type="checkbox"/>

Engineer Sign  


<b>6.Hardware Diagnostics Test</b>			
Power Supply		Value	Status
-12 VDC	(+/- 5 %)	-12.5 V	Passed ✓
+12 VDC	(+/- 5 %)	+11.91 V	Passed ✓
+3.3VDC	(+/- 5 %)	3.3 V	Passed ✓
+5.0 VDC	(+/- 5 %)	4.945 V	Passed ✓
+13.5 VDC	(+/- 5 %)	13.41 V	Passed ✓
Plasma Generator			
ICP Current	0.500A = 1kW	0.5002 A	Passed ✓
ICP Ref	5.0Vdc = 1kW	5.002 V	Passed ✓
ICP Current	0.00 Vdc = 0kW	0 A	Passed ✓
ICP Ref	0.00Vdc = 0kW	0 V	Passed ✓
RF Water (Hz)	OFF (1 Hz)	0 Hz	Passed ✓
RF Water (Hz)	ON (25-35 Hz)	35 Hz	Passed ✓
Air Knife Pres.	(0.00V) OFF	0 V	Passed ✓
Air Knife Pres.	(3.0 - 7.0 V) ON	3.36 V	Passed ✓
Neb	setting to 25 psi	reading 25 psi	Passed ✓
Cool	setting to 16 lpm	reading 16 lpm	Passed ✓
Aux	setting to 0.5 lpm	reading 0.5 lpm	Passed ✓
Camera Water pump			
Pump Current	(0.000 A) OFF	0 A	Passed ✓
Pump Voltage	(0.000 V) OFF	0 V	Passed ✓
Pump Current	(0.8 to 4.0A) ON	1.1 A	Passed ✓
Pump Voltage	(8 to 13 V) ON	12.43 V	Passed ✓
Set Points			
Cam Tec Temperature	(-30 to -38°C)	Set -32 °C Read -31 °C	Passed ✓
Op Purge Low	(0-15.5 lpm)	Set 5 lpm Read 5.1 lpm	Passed ✓
Op Purge High	(0-15.5 lpm)	Set 10 lpm Read 10.1 lpm	Passed ✓
Cam Wtr T	(25-30 °C)	Set 25 °C Read 25 °C	Passed ✓

<b>7.Cleaning &amp; Replacement</b>	
O-Ring Torch replacement	Status
Pump Tubing replacement	OK ✓
Glassware cleaning	OK ✓
Lubricate the roll peristaltic pump	OK ✓
Optical windows cleaning	OK ✓
Change & refilled Detector water chiller	OK ✓
Change & refilled RF Generator water Chiller	OK ✓
Clean All Electronics Board	OK ✓

Engineer Sign




---

**ORIFICE TRANSFER STANDARD CERTIFICATION**

**WORKSHEET TE-5025A**

**ROOTSMETER S/N 0438320**



TISCH ENVIRONMENTAL, INC.  
145 SOUTH MIAMI AVE  
VILLAGE OF CLEVELAND, OH  
44102  
513.467.9000  
877.263.7810 TOLL FREE  
513.467.9008 FAX

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Mar 24, 2016 Rootmeter S/N 0438320 Ta (K) - 295  
Operator Tisch Orifice I.D. - 0136 Pa (mm) - 742.95

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORIFICE DIFF H2O (in.)
1	NA	NA	1.00	1.3400	3.2	2.00
2	NA	NA	1.00	0.9510	6.3	4.00
3	NA	NA	1.00	0.8510	7.8	5.00
4	NA	NA	1.00	0.8130	8.6	5.50
5	NA	NA	1.00	0.6690	12.6	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
0.9832	0.7337	1.4054	0.9957	0.7430	0.8911
0.9791	1.0296	1.9875	0.9915	1.0426	1.2603
0.9770	1.1481	2.2221	0.9894	1.1626	1.4090
0.9760	1.2006	2.3305	0.9884	1.2157	1.4778
0.9707	1.4510	2.8107	0.9830	1.4694	1.7823
Qstd slope (m)	1.96262		Qa slope (m)	1.22826	
intercept (b)	-0.03249		intercept (b)	-0.02060	
coefficient (r)	0.99993		coefficient (r)	0.99993	
Y axis = SQRT(H2O(Pa/760) (298/Ta))					

CALCULATIONS

Vstd = Diff. Vol [(Pa-Diff. Hg)/760] (298/Ta)  
Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg)/Pa]  
Qa = Va/Time

For subsequent flow rate calculations:

Qstd =  $1/m \{ [SQRT(H2O(Pa/760) (298/Ta))] - b \}$   
Qa =  $1/m \{ [SQRT(H2O(Ta/Pa))] - b \}$

**COPY**

**Primary Flow Calibrator**  
**Serial No. : 110619 , 207510**

Certificate of Calibration

Customer : Eastern Thai Consulting 1992 Co., Ltd.  
Name :  
Address : 683 Moo 11, Sukhaphibam 8 Rd., Nongkhham, Srinachul, Chonburi 20230

Certificate No : 24-AFM-073  
Request No : Req-2024-0095

Unit Under Calibration Details

Measurement Item : Primary Flow Calibrator  
Manufacturer : Bios  
Model : Defender 510-L  
Serial Number : 110619  
ID :  
Sensor Model : -  
Sensor Serial Number : -

Location of Calibration : LAB 4 AIR VELOCITY METER

Calibration Environment and Details

Temperature : 23 °C ± 0.3 °C  
Humidity : 55 %RH ± 20 %RH  
Barometric Pressure : 1013 hPa ± 10 hPa  
Received Date : 11 January 2024  
Calibration Date : 30 January 2024

Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	12 July 2024
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	12 July 2024
Temperature meter	GT 11	080000057	Qrebon	27 February 2024
Pressure meter	CPG2400	41000KDU651882	TPA	9 November 2024

Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

Note :

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor  $k = 2$ , providing a level of confidence approximately 95 %.

Calibration By : 

Mr. Noppadon Luangart  
Service Calibration Engineer

Approved By : 

Mr. Pait Mathavorn  
Calibration Engineer Supervisor

Issue Date : 30 January 2024

Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)
24.80	101.23	0	0.00	0.0000	0.0058
24.40	101.18	50	49.629	-0.4	3.3
24.40	101.16	100	100.73	0.7	2.8
24.30	101.13	200	198.30	-1.7	5.6
24.30	101.10	300	298.14	-1.9	8.4
24.40	101.06	400	397.45	-3	11
24.20	101.00	500	496.93	-3.1	7.1

Note

STD : Standard UUC : Unit Under Calibration

- UUC Reference Condition : At atmospheric pressure and room temperature condition
- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P_{meas}} \times \frac{T_{meas}}{T_{ref}}$$

where Q : Flow Rate

P = Absolute Pressure

T = Absolute Temperature

Meas = Measurement Condition

ref = Standard Condition

\* Indicates non accredited

End of Certificate

COPY

COPY

Certificate of Calibration

**Customer**

**Name** : Eastern Thai Consulting 1992 Co., Ltd.

**Address** : 683 Moo 11, Sukhapibam 8 Rd., Nongkham, Sriracha, Chonburi 20230

**Certificate No** : 24-AFM-022

**Request No** : Req-2024-0094

Unit Under Calibration Details

**Measurement Item** : Primary Flow Calibrator

**Manufacturer** : MesaLabs

**Model** : Defender S10-M

**Serial Number** : 207510

**ID** : -

**Sensor Model** : -

**Sensor Serial Number** : -

**Location of Calibration** : LAB 4 AIR VELOCITY METER

Calibration Environment and Details

**Temperature** : 23 °C ± 3 °C

**Humidity** : 55 %RH ± 20 %RH

**Barometric Pressure** : 1013 hPa ± 10 hPa

**Received Date** : 11 January 2024

**Calibration Date** : 30 January 2024

**Calibration Procedure** : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Scensidyne	12 July 2024
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Scensidyne	12 July 2024
Temperature meter	GT 11	080000057	Qreburn	27 February 2024
Pressure meter	CPG2400	41000KDU/651882	TPA	9 November 2024

Traceability :

This Certificate is traceable to SI Unit through Scensidyne A2LA Accreditation No. 3943.01

Note :

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor  $k = 2$ , providing a level of confidence approximately 95 %.

**Calibration By** :   
Mr. Noppadon Luangart  
Service Calibration Engineer

**Approved By** :   
Mr. Pucit Malhavorn  
Calibration Engineer Supervisor

**Issue Date** : 30 January 2024

**COPY**

Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)
24.80	101.23	0	0.00	0.0000	0.0058
24.70	101.58	101	101.48	0.5	2.8
24.80	101.50	200	201.14	1.1	5.6
24.70	101.50	500	503.87	3.9	7.1
24.80	101.50	1003	1010.1	7	14
24.70	101.60	2002	2014.6	13	29
24.60	101.33	2995	3007.6	13	43
24.60	101.65	4027	4007.5	-19	57
24.50	101.70	5035	5010.7	-24	72

Note

- STD : Standard UUC : Unit Under Calibration
- UUC Reference Condition : At atmospheric pressure and room temperature condition
- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P_{meas}} \times \frac{T_{meas}}{T_{ref}}$$

where  $Q$  Flow Rate  $P$  Absolute Pressure  $T$  Absolute Temperature  
 $Q_{meas}$  = Measurement Condition  $Q_{ref}$  Standard Condition

\* Indicates non accredited

End of Certificate

**THERMO-HYGROMETER**

**Model : 608-H1**

**Serial No. : 45106737**



## CERTIFICATE OF CALIBRATION

Certificate No. : 23-055203  
Sample Code : 23-21440-001

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapibarn 8 Rd., Nongkham,  
Siracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited  
(Calibration laboratory)

Equipment : Digital thermo-hygrometer

Manufacturer : testo

Model : 608-H1

Serial No. : 45106737

ID No. : LABE 09/7

Date of Receipt : 25 May 2023

Date of Calibration : 29 May 2023

## Condition of Calibration

1. Environment 1.1 Ambient temperature :  $23.0\text{ }^{\circ}\text{C} \pm 3.0\text{ }^{\circ}\text{C}$   
1.2 Relative humidity :  $55.0\text{ \%} \pm 15.0\text{ \%}$

## 2. Calibration method

2.1 In-house method: WI-CL-045 By comparison with thermometer standard / chilled mirror hygrometer in controlled chamber.

2.2 The calibration by comparison unit under calibration (UUC) to the thermometer standard / chilled mirror hygrometer in a chamber at the controlled temperature / relative humidity.

## 3. Reference standard instrument

Instrument	Model	ID No.	Certificate No.	Due Date
3.1 Chilled Mirror	Optidew Vision	LB-DP-02 & LB-DP-02 (DP)	TH-0157-22	05 December 2023
3.2 Digital Thermometer	Optidew Vision	LB-DP-02 & LB-DP-02 (Temp.)	23-014916	12 February 2024
3.3 Digital Thermometer	34972A	LB-DA-07 with RTD-89	22-095535	06 September 2023

## 4. This certificate is traceable to the international system of unit (SI Unit).

4.1 Instrument No. 3.1 through National Institute of Metrology (Thailand).

4.2 Instrument No. 3.2 and 3.3 through Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

5. This result of calibration was found accurate as shown on date and place of calibration only.

6. Condition of calibration item : Normal

Calibrated by : Miss Pornsuda Lohabal : Approved by : (Mr. Somchai Neampunt)  
Scientist : Signed for Director

Issue date : 31 May 2023

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).



## REPORT OF CALIBRATION

Certificate No. : 23-055203  
Sample Code : 23-21440-001

## Results of Calibration

## Temperature measurement

Resolution :  $0.1\text{ }^{\circ}\text{C}$   
Range :  $0\text{ }^{\circ}\text{C}$  to  $50\text{ }^{\circ}\text{C}$

Calibration point $^{\circ}\text{C}$	Average of standard reading		Unit under calibration		Expanded uncertainty $^{\circ}\text{C}$
	Controlled humidity %RH	Temperature $^{\circ}\text{C}$	Average reading $^{\circ}\text{C}$	Correction value $^{\circ}\text{C}$	
20	50	20.00	20.0	0.00	$\pm 0.39$
25	50	25.02	25.1	- 0.08	$\pm 0.39$
30	50	30.00	30.0	0.00	$\pm 0.39$

## Humidity measurement

Resolution :  $0.1\text{ \%RH}$   
Range :  $10\text{ \%RH}$  to  $95\text{ \%RH}$

Calibration point %RH	Average of standard reading		Unit under calibration		Expanded uncertainty %RH
	Air temperature $^{\circ}\text{C}$	Calculated humidity %RH	Average reading %RH	Correction value %RH	
45	25.00	45.18	53.5	- 8.32	$\pm 1.3$
60	25.00	60.03	68.3	- 8.27	$\pm 1.5$
75	25.00	75.20	83.2	- 8.00	$\pm 1.7$

## Notes

Calibration results without adjustment.

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty multiplied by the coverage factor  $k$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

- End of Report -

COPY

**CERTIFICATE OF ANALYSIS**

**EPA PROTOCOL GAS**

**Cylinder No. : EB0062815**

## CERTIFICATE OF ANALYSIS

### Grade of Product: EPA Protocol

Part Number: E04N199E15ACX9C Reference Number: 82-401135335-1  
Cylinder Number: EB0062815 Cylinder Volume: 144.4 CF  
Laboratory: 124 - Riverton (SAP) - NJ Cylinder Pressure: 2015 PSIG  
PGVP Number: B52018 Valve Outlet: 660  
Gas Code: CO,NO,NOX,SO2,BALN Certification Date: Mar 13, 2018  
Expiration Date: Mar 13, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a certified purity uncertainty as stated below with a confidence level of 95%. There are no significant impurities which are noted.

Minimum Volume: 100 ppm for all gases except for NO, which is 10 ppm.

Do Not Use This Cylinder below 160 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS				
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
NOX	50.00 PPM	50.55 PPM	G1	+/- 1.4% NIST Traceable
NITRIC OXIDE	50.00 PPM	50.50 PPM	G1	+/- 1.4% NIST Traceable
SULFUR DIOXIDE	50.00 PPM	51.01 PPM	G1	+/- 1.0% NIST Traceable
CARBON MONOXIDE	2000 PPM	1977 PPM	G1	+/- 1.0% NIST Traceable
NITROGEN	Balance			
ANALYTICAL DATES				
NOX				03/06/2018, 03/13/2018
NITRIC OXIDE				03/06/2018, 03/13/2018
SULFUR DIOXIDE				03/06/2018, 03/13/2018
CARBON MONOXIDE				03/06/2018, 03/13/2018
NITROGEN				03/06/2018

CALIBRATION STANDARDS			
Type	Lot ID	Cylinder No	Expiration Date
NTRM	16060607	CC442364	Jun 27, 2020
PRM	12367	APEX1099237	Jun 02, 2017
GMIS	0315201604	CC503358	Mar 15, 2019
NTRM	16011025	CC473218	Jun 07, 2022
NTRM	12060735	CC356192	Dec 14, 2026

The SRM, PRM or RGM noted above is only in reference to the GMS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 APWT100391 CO	FTIR	Feb 08, 2018
Nicolet 6700 APWT100391 NO	FTIR	Feb 15, 2018
Nicolet 6700 APWT100391 NO2	FTIR	Feb 16, 2018
Nicolet 6700 APWT100391 SO2	FTIR	Mar 01, 2018

#### Triad Data Available Upon Request

NOTES: NET WEIGHT: 10.43lbs

GROSS WEIGHT: 60.93lbs

PO# 5218000763

This calibration std. has been certified in accordance with the May 2012 EPA Traceability Protocol. All testing processes and measurements conform to the requirements of ISO/IEC 17025 and to Airgas ISO 9001:2000 and relate only to items identified on this certificate. All gases are certified to be NIST Traceable with total uncertainty as detailed under Analytical Uncertainty. This document shall not be reproduced in full without written approval of the issuer.



TESTING CERT No. 3082.05

*Don Moran*  
Approved for Release

**ANALYTICAL BALANCE (DU)**

**Model. : XS205DU**

**Serial No. : 1126323724**

Certificate No. : 23-006683  
Sample Code : 23-02820-006

Certificate No. : 23-006683  
Sample Code : 23-02820-006

## CERTIFICATE OF CALIBRATION

**Customer** : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhaphiban 8 Rd., Nongkham,  
Sriracha, Chonburi 20230

**Location of Calibration** : EASTERN THAI CONSULTING 1992 CO., LTD.  
(Analytical Balance Room)

**Equipment** : ELECTRONIC BALANCE

**Manufacturer** : METTLER TOLEDO

**Model** : XS205DU

**Serial No.** : 1126323724

**ID No.** : LABE 05/1

**Date of Receipt** : 20 January 2023

**Date of Calibration** : 20 January 2023

**Calibrated by** : Mr. Thanadol Phoithep  
Scientist

**Issue date** : 25 January 2023

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC)

361 Soi Ladprao 122, Ladprao Road,  
Phlabphla, Wang Thonglang, Bangkok 10310  
Phlabphla, Wang Thonglang, Bangkok 10310

CONTACT@AMARC.CO.TH  
WWW.AMARC.CO.TH  
Effective Date: 15/10/21

TEL 02-516-2422  
FAX 02-516-6949  
Rev.05

## REPORT OF CALIBRATION

**Equipment** : ELECTRONIC BALANCE  
**Manufacturer** : METTLER TOLEDO  
**Model** : XS205DU  
**Capacity** : Max 81 g / 220 g  
**Resolution** : 0.01 mg / 0.1 mg  
**Serial No.** : 1126323724  
**ID No.** : LABE 05/1

### Result of Calibration

#### 1. Test weight and repeatability of reading

Repeatability is a measure of the ability of a balance to supply the same result in repetitive weighings with one and the same load under the same measurement condition. The measurement of the repeatability must include both the balance specifications and the ambient (vibration, fluctuating air current/temperature/humidity, etc.) Operator handling of the balance is also included in the standard deviation.

Unit : g	Range : 80	Before adjustment	After adjustment
<input checked="" type="checkbox"/> No adjustment	Nominal value	40	90
<input type="checkbox"/> Adjustment	Standard weight	40.000042	80.000045
	Average reading of indicator	40.00015	80.00019
	Standard deviation	0.000004	0.000007
Unit : g	Range : 200	Before adjustment	After adjustment
<input checked="" type="checkbox"/> No adjustment	Nominal value	100	200
<input type="checkbox"/> Adjustment	Standard weight	100.000022	200.000199
	Average reading of indicator	100.0001	200.0004
	Standard deviation	0.00004	0.00008

COPY

361 Soi Ladprao 122, Ladprao Road,  
Phlabphla, Wang Thonglang, Bangkok 10310  
Phlabphla, Wang Thonglang, Bangkok 10310

CONTACT@AMARC.CO.TH  
WWW.AMARC.CO.TH  
Effective Date: 15/10/21

TEL 02-516-2422  
FAX 02-516-6949  
Rev.03



Certificate No. : 23-006683  
Sample Code : 23-02820-006

Page 3 of 4

## REPORT OF CALIBRATION

### Result of Calibration

#### 2. Sensitivity or value of a scale division

Change in the output variable of a measuring instrument divided by the associated change in the input variable.

Unit : g		Range : 200	
Test Point	Sensitivity, S	Test Point	Sensitivity, S
0	0.99800	0	0.9980
40	0.99800	100	0.9980
80	0.99800	200	0.9980

#### 3. Departure of indication from nominal value, Linearity

Unit : g		Expanded Uncertainty		Coverage Factor (k)	
Nominal Value	Standard Value	Average Reading of Indicator	Correction Value	Expanded Uncertainty	Coverage Factor (k)
Unload	0.000000	0.00000	0.00000	0.0000090	2.01
0.01	0.0100036	0.01000	0.00000	0.0000093	2.01
0.1	0.1000062	0.10000	0.00001	0.000012	2.00
1	1.0000036	1.00001	-0.00001	0.000014	2.00
5	5.0000044	5.00003	-0.00003	0.000020	2.00
10	10.000000	10.00007	-0.00007	0.000032	2.00
20	20.000016	20.00011	-0.00009	0.000036	2.00
50	50.000029	50.00013	-0.00010	0.000067	2.00
100	100.000022	100.0001	-0.0001	0.00016	2.00
150	150.000051	150.0001	0.0000	0.00023	2.00
200	200.000199	200.0003	-0.0001	0.00028	2.00

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.



Certificate No. : 23-006683  
Sample Code : 23-02820-006

Page 4 of 4

## REPORT OF CALIBRATION

### Result of Calibration :

#### 4. Eccentric or off-centre loading

Deviation of the measurement value through off - center (eccentric) loading. The corner load increases with the weight of the load and its removal from the center of the pan support.

Weighing pan		Test weight : 50 and 100	
		Unit : g	
		Range	
		Position	
		Reading of indicator	
		100.0001	
		99.9998	
		100.0000	
		100.0001	
		100.0001	
		100.0001	
		0.00008	

### Condition of Calibration

1. Calibration Method : WI-CL-004 base on UKAS LAB 14: 2019

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

3. Condition of Calibration item: Normal

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

Through the reference standard laboratory of Asia Medical and Agricultural Laboratory and Research Center Public

Company Limited (Instrument number 1).

5. Reference standard instrument :

Instrument : 1) STANDARD WEIGHT 1 mg to 1 kg

Class : E2

Certificate No. : 22-060639

Due Date : 27 June 2023

6. Ambient conditions		Min	Max
Temperature (°C)		21.3	22.4
Relative Humidity (%Rh)		38.2	40.4
Air pressure (hPa)		1008.4	1010.1

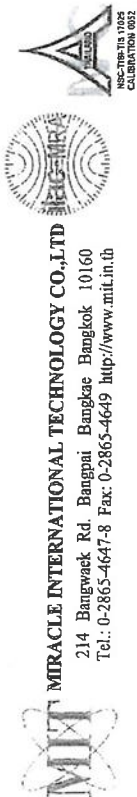
COPY

- End of Report -

## **BAROMETER**

**Equipment : Analog Barometer**

**ID No. / Tag No. : BM001/41**



MIRACLE INTERNATIONAL TECHNOLOGY CO., LTD  
214 Bangwaek Rd. Bangpai Bangkae Bangkok 10160  
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



## CALIBRATION CERTIFICATE

Certificate No. : L202305085-002  
Date Issued : 16-May-23

**Customer** : Eastern Thai Consulting 1992 Co., Ltd.  
683 Moo 11 Sukhaphibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

**Equipment** : Analog Barometer

**Manufacturer** : Barigo  
**Model** : -  
**Serial No.** : -  
**ID No./Tag No.** : BM001/41  
**Date Received** : 11-May-23  
**Date Calibrated** : 15-May-23

**Calibrated by** : Mr. Jame Khaohong

Calibration Method or Calibration Procedure Used

In-house method : CP-21 base on DKD-R 6-1: Edition 3 2014.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

### Result of Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level confidence approximately 95 percent.

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



Page 1 of 2

Approved by: *Sorayuth*  
( Mr. Sarayuth Tochua )

**COPY**

Certificate No. : L202305085-002  
**Environment** : Ambient Temperature : (25 ± 2)°C  
Relative Humidity : (30 ± 15)%RH

STD Reading mbar	UUC Reading (mbar) Before Adjusted	UUC Reading (mbar) After Adjusted	UUC Error mbar	Uncertainty ± mbar
990.00	990.0	-	0.00	0.61
1000.00	1000.0	-	0.00	0.61
1010.00	1010.0	-	0.00	0.61
1020.00	1020.0	-	0.00	0.61
1030.00	1030.0	-	0.00	0.61

### STD = Standard

### UUC = Unit Under Calibration

**Calibrated condition :** Pressure Medium : Air : Density = 1.19 kg/m<sup>3</sup> @ 20°C, 1 bar  
Mounting Position : Vertical  
Reference Level : at center of its dial  
Conversion Factor : Multiply by 1.0 E+02 - Pa unit

### Description of UUC :

**Range** : 990 - 1030 mbar Absolute  
**Calibration Range** : 990 - 1030 mbar Absolute  
**Scale Interval** : 1 mbar  
**Resolution** : 0.5 mbar Absolute

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

### Measurement Standards Used & Traceability :

The International System of Units (SI) through

IRPC Certificate No. CL1-P220104 for Reference Pressure Monitor Serial No. 1598, Due 11-Nov-23

End of Certificate

Page 2 of 2

**COPY**

**DRY GAS METER MC-572V**

**Serial No. : 0504003**

# Certificate Of Calibration

Method 5 Pre-Test Console Calibration - Cubic meter (m<sup>3</sup>)

## Meter Console Information

Console Model : MC572V  
Console serial : 0504003  
DGM Model #: SK2SEX  
DGM Serial #: 0009854

## Calibration Condition

Calibration Date: 3-Apr-23  
Issue Date: 3-Apr-23  
Cal. Report No.: WDS-SV660039  
Ambient Temp (°C): 25  
Pressure (mm Hg): 758  
Relative Humidity (%): 60

## Factors/Conversion

Std. Temp (°K): 298  
Std. Pressure (mm Hg): 760  
K<sub>1</sub> (K/mm Hg): 0.3857

## Reference Equipment

WTM Model: W-NKoDa-5B WTM Cal. Due Date: Nov. 2022  
WTM Serial: 600245 Gamma: 1.0000

## UUT Meter (DGM)

Run Time (minutes)	DGM Orifice (mm H <sub>2</sub> O)	Volume		Outlet Temp		Volume		Outlet Temp	
		Initial	Final	Initial	Final	Initial	Final	Initial	Final
15.00	13.0	2.1249	2.2873	26	26	11.24924	11.40853	25	25
10.00	25.0	1.9384	2.0984	26	26	11.06645	11.22136	25	25
8.00	50.0	1.7294	1.9105	26	26	10.86093	11.03905	25	25
7.00	80.0	1.4887	1.6921	26	26	10.62322	10.82407	25	25
5.00	120.0	1.1950	1.3736	26	26	10.33100	10.50914	25	25

## Reference Meter (WTM)

## Standardized Data

Test Meter		Reference Meter		Correction Factor		Calibration Results		
Std. Volume	Std. Flow Rate	Std. Volume	Std. Flow Rate	"Gamma"	Variation	Flow Rate	Std & Corr	ΔH@ (mm H <sub>2</sub> O)
V <sub>std</sub> (m <sup>3</sup> )	Q <sub>std</sub> m <sup>3</sup> /min	V <sub>std</sub> (m <sup>3</sup> )	Q <sub>std</sub> m <sup>3</sup> /min	(Y)	(ΔY)	Q <sub>std</sub> (m <sup>3</sup> /min)	ΔH <sub>0</sub>	ΔH <sub>0</sub>
0.159	0.011	0.156	0.010	0.983	-0.001	0.010	52.990	5.531
0.155	0.015	0.152	0.015	0.981	-0.002	0.015	47.999	0.540
0.178	0.022	0.175	0.022	0.982	-0.002	0.022	46.696	-0.763
0.200	0.029	0.197	0.028	0.983	-0.001	0.028	45.249	-2.210
0.177	0.035	0.175	0.035	0.989	0.006	0.035	44.361	-3.098
				0.984	= Y Avg		47.459	= ΔH@ Avg

Pass/Fail Result: **Pass**

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter. Acceptable tolerance of individual values from the average is ±0.02  
Note: For ΔH<sub>0</sub>, orifice pressure differential that equates to 0.75cfm (0.0212m<sup>3</sup>/min) at standard temperature and pressure. Acceptable tolerance of individual values from the average is ±0.2 inches (5.1mm) H<sub>2</sub>O

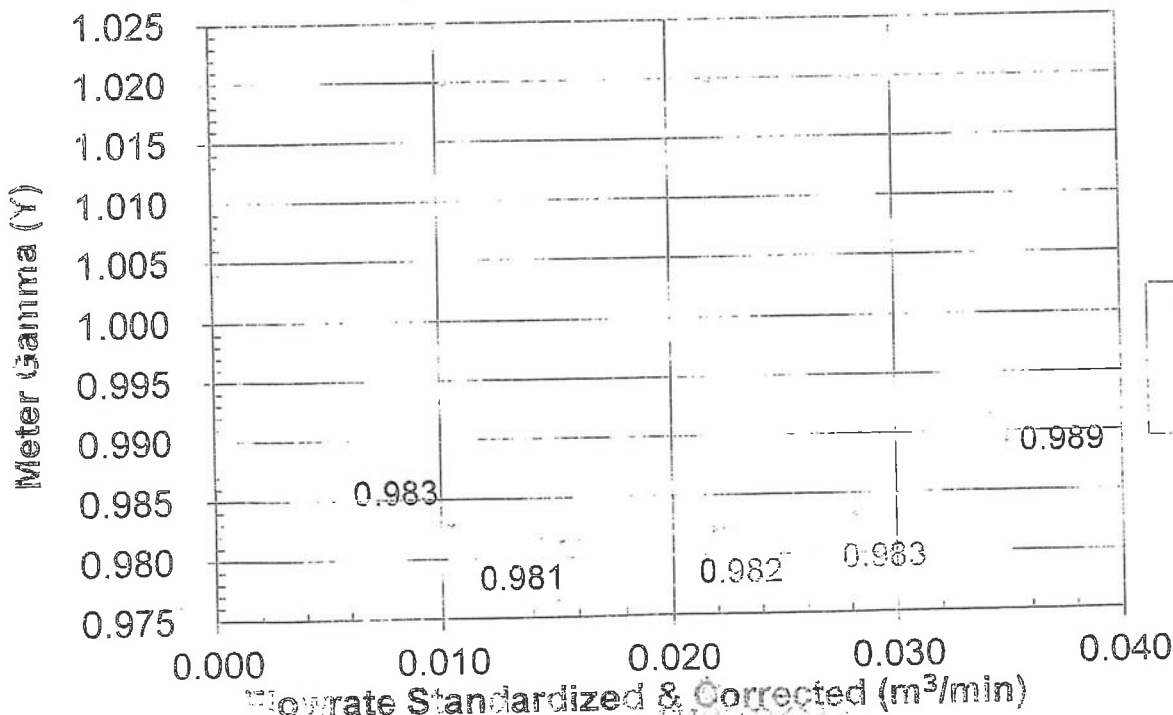
Approved By:

(Patpasu Chalsana)  
Service Manager

Date: 3-Apr-23

**COPY**

## Meter Gamma vs Flowrate



Console Serial

0504003

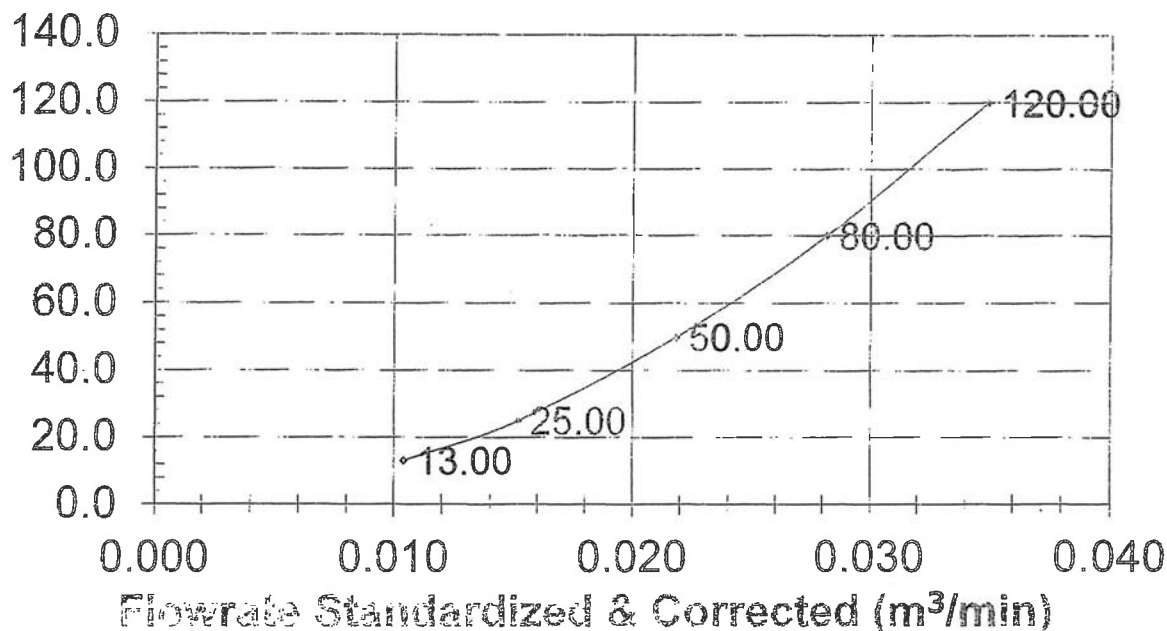
Console Model

MC572V

**COPY**

DGM Orifice  $\Delta H$  (mm H<sub>2</sub>O)

## Meter Pressure vs Flowrate



Console Serial: 0504003



บริษัท วิสคอม โซลูชั่นส์ เซลส์ แอนด์ เซอร์วิส กรุ๊ป จำกัด  
WISDOM SCIENCE SALE AND SERVICE GROUP COMPANY LIMITED

Console Model: MC572V

**COPY**

### TEMPERATURE DISPLAY CALIBRATION

Meter Console Information		Calibration Conditions		Reference Equipment	
Console Model :	MC572V	Cal. Date :	3-Apr-23	Temp. Simulator Model :	FLUKE 714B
Console serial :	0504003	Issue Date :	3-Apr-23	Serial No	60590035
Temp. Indicator Model :	785-KF	Cal. Report No. :	WDS-SV660039		
Temp. Indicator Serial :	JC17852	Ambient Temp. (°C) :	25		
		Pressure (mm Hg) :	758		
		Humidity (%) :	60		

#### Temperature Sensor Calibration

Reference Point	Ref. Temperature	Temperature	Temperature
#	°C	°C	°C
1	-18.0	-17.0	1.0
2	38.0	37.0	1.0
3	93.0	92.0	1.0
4	149.0	148.0	1.0
5	260.0	259.0	1.0
6	371.0	372.0	-1.0
7	482.0	482.0	0.0
8	593.0	594.0	-1.0
9	816.0	816.0	0.0
10	1038.0	1038.0	0.0
Maximum			1.0

#### Note

For valid test results, the maximum difference between temperature readings should  $\leq 1.0^\circ\text{C}$  (EPA Method 5, Section 6.1.1.8).  
Perform all TC Channel calibrations, Except meter (DGM) channel

PASS

#### DGM Out Temperature Sensor Calibration

Temperature point	Ref. Temperature	Temperature	Temperature
#	°C	°C	°C
Ambient	26.5	26.0	0.5
Heat	100.5	102.0	-1.5

DGM Out Temp. Diff.  $\pm 3^\circ\text{C}$

PASS

Approved By :

(Patrasai Chaisana)  
Service Manager

WISDOM SCIENCE SALE AND SERVICE GROUP COMPANY LIMITED  
Address 9/11/5 Lumpini Town Villa Ratchapruk-Pinkao Village No. 4, Bang Khanun, Bang Kruei, Nonthaburi 11130 Thailand

**COPY**

**DRY GAS METER XC-572-OV**

**Serial No. : A2204323**



**WISDOM SCIENCE**  
SALE AND SERVICE GROUP COMPANY LIMITED

## Certificate Of Calibration

Method 5 Pre-Test Console Calibration - Cubic meter (m<sup>3</sup>)

### Meter Console Information

Console Model : XC-572-OV  
Console serial : A2204323  
DGM Model #: SK25EX  
DGM Serial #: 00008294

### Calibration Condition

Calibration Date: 2-May-2023  
Due Date: 1-May-2024  
Cal. Report No.: WDS-SV660086  
Ambient Temp (°C): 25  
Pressure (mm Hg): 758  
Relative Humidity (%): 55

### Factors/Conversion

Std. Temp. (°K): 298  
Std. Pressure (mm Hg): 760  
K<sub>1</sub> (K/mm Hg): 0.3857

### Reference Equipment

WTM Model: W-NK0Da-5B  
WTM Serial: 600245  
WTM Cal. Date: 22-Nov-2022  
Gamma: 1.0000

UUT Meter (DGM)						Reference Meter (WTM)			
Run Time (minutes)	DGM Orifice (mm H <sub>2</sub> O)	Volume		Outlet Temp		Volume		Outlet Temp	
		Initial	Final	Initial	Final	Initial	Final	Initial	Final
e	P <sub>mfat</sub>	V <sub>ml</sub>	V <sub>ml</sub>	t <sub>ml</sub>	t <sub>ml</sub>	V <sub>ml</sub>	V <sub>ml</sub>	t <sub>ml</sub>	t <sub>ml</sub>
15.00	13.0	18.0685	18.2252	25	26	17.55844	17.71573	25	25
10.00	25.0	18.2477	18.3984	25	26	17.73837	17.88948	25	25
8.00	50.0	18.4339	18.6056	25	26	17.92517	18.09730	25	25
7.00	80.0	18.6458	18.8344	25	27	18.13775	18.32707	25	25
5.00	120.0	18.8839	19.0510	25	27	18.37705	18.54528	25	25

Standardized Data				Calibration Results				
Test Meter		Reference Meter		Correction Factor		Flow Rate	ΔH@ (mm H <sub>2</sub> O)	
Std. Volume	Std. Flow Rate	Std. Volume	Std. Flow Rate	"Gamma"	Variation	Std & Corr	0.0212 SCMM	Variation
V <sub>std</sub> (m <sup>3</sup> )	Q <sub>std</sub> (m <sup>3</sup> /min)	V <sub>std</sub> (m <sup>3</sup> )	Q <sub>std</sub> (m <sup>3</sup> /min)	(Y)	(ΔY)	Q <sub>std</sub> (m <sup>3</sup> /min)	ΔH <sub>e</sub>	ΔΔH <sub>e</sub>
0.154	0.010	0.154	0.010	1.004	0.003	0.010	54.437	3.293
0.148	0.015	0.148	0.015	1.002	0.001	0.015	50.528	-0.616
0.169	0.021	0.169	0.021	0.999	-0.001	0.021	50.086	-1.058
0.186	0.027	0.186	0.027	0.999	-0.001	0.027	50.928	-0.216
0.165	0.033	0.165	0.033	0.999	-0.002	0.033	49.741	-1.403
				1.001	= Y Avg.		51.144	= ΔH@ Avg.

Pass/Fail Result: **PASS**

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02.

Note: For ΔH<sub>e</sub>, orifice pressure differential that equates to 0.75cm (0.0212m<sup>3</sup>/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is ±0.2inches (5.1mm) H<sub>2</sub>O.

Approved By:

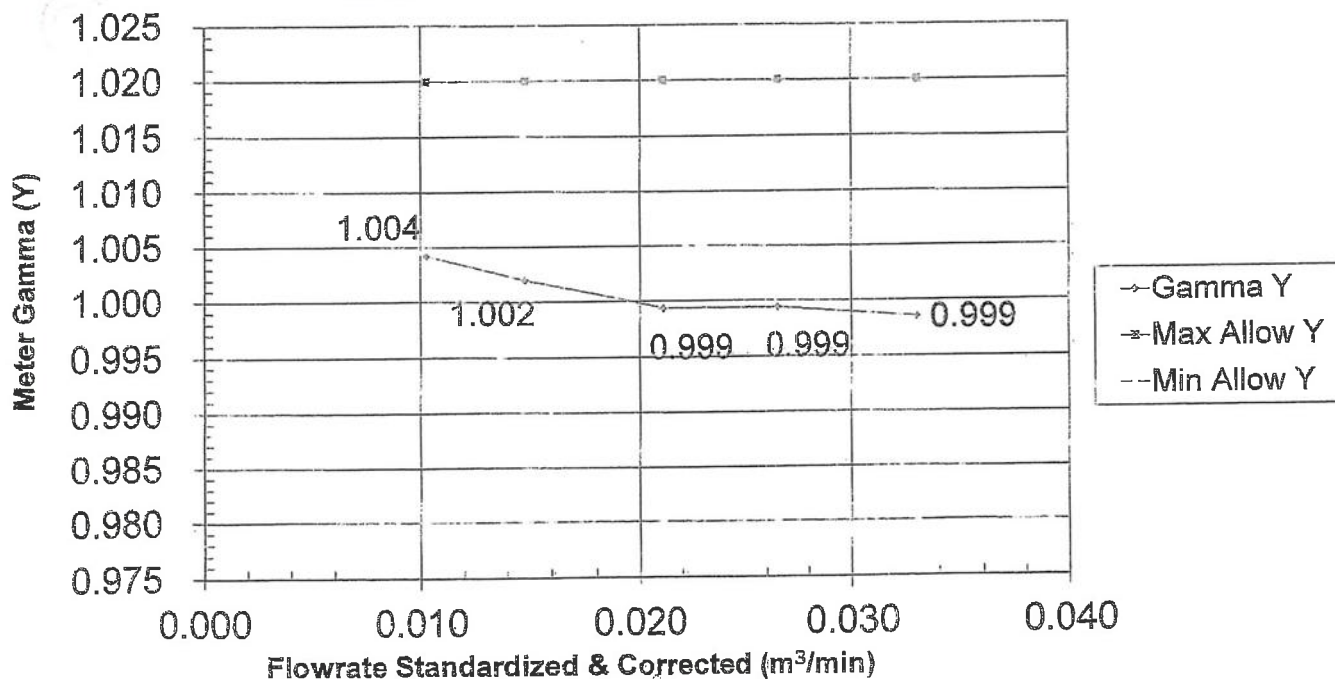
(Patpasu Chaisana)  
Service Manager

บริษัท วิสโดม ไซน์แอนด์เซอร์วิส กรุ๊ป จำกัด  
WISDOM SCIENCE SALE AND SERVICE GROUP COMPANY LIMITED

Date: 2-May-2023

**COPY**

## Meter Gamma vs Flowrate



Console Serial: A2204323

Console Model: XC-572-OV

**WISDOM SCIENCE**  
บริษัท วิสโดม ไซน์แอนด์เซอร์วิส กรุ๊ป จำกัด  
WISDOM SCIENCE SALE AND SERVICE GROUP COMPANY LIMITED

**COPY**



WISDOM SCIENCE

## TEMPERATURE DISPLAY CALIBRATION

### Meter Console Information

Console Model: XC-572-OV  
Console Serial: A2204323  
Temp. Indicator Model: 765-KF  
Temp. Indicator Serial: JC19022

### Calibration Conditions

Cal. Date: 2-May-2023  
Due Date: 1-May-2024  
Cal. Report No.: WDS-SV600068  
Ambient Temp. (°C): 25  
Pressure (mm Hg): 758  
Humidity (%): 55

### Reference Equipment

Temp. Simulator Model: FLUKE 714B  
Serial No.: 60590035  
Calibration Date: 14-Feb-2023

### Temperature Sensor Calibration

Reference Point	Ref. Thermometer Temperature °C	Thermocouple Display Temperature °C	Temperature Difference °C
#	°C	°C	°C
1	-18.0	-17.0	1.0
2	25.0	25.0	0.0
3	90.0	90.0	0.0
4	120.0	120.0	0.0
5	250.0	249.0	1.0
6	380.0	380.0	0.0
7	500.0	500.0	0.0
8	620.0	620.0	0.0
9	740.0	739.0	1.0
10	860.0	860.0	0.0
Maximum <sup>1</sup>			1.0

### Note

<sup>1</sup> For valid test results, the maximum difference between temperature readings should  $\leq 1.0^{\circ}\text{C}$  (EPA Method 5, Section 6.1.1.8).  
Perform AUX, STACK, PROBE, OVEN, FILTER, EXIT. Except meter (DGM) channel

๑-37

### DGM Out Temperature Sensor Calibration

Temperature point	Ref. Thermometer Temperature °C	Thermocouple Display Temperature °C	Temperature Difference °C
#	°C	°C	°C
Ambient	28.8	29.0	-0.2
Heat	100.0	101.3	-1.3

### Difference Rang

DGM Out Temp. Diff.  $\pm 3^{\circ}\text{C}$

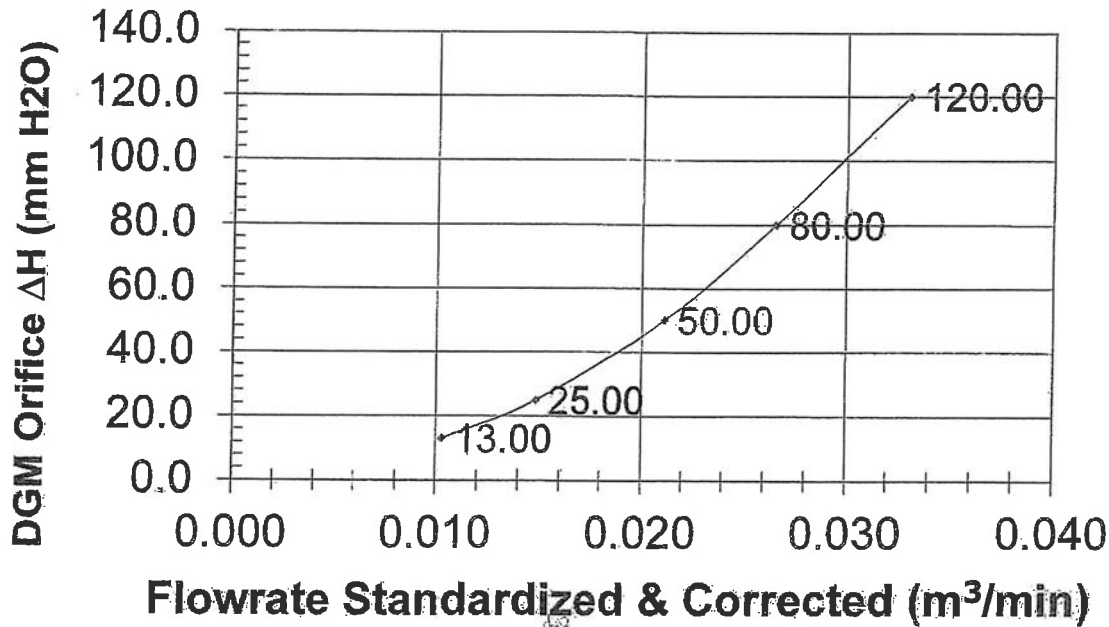
Approved By :

*[Signature]*  
W. Pichai Chaisaeng  
Service Manager

บริษัท วิสโดม ไซนส์ แอนด์ เซอร์วิส กรุ๊ป จำกัด  
WISDOM SCIENCE SALE AND SERVICE GROUP COMPANY LIMITED

**COPY**

## Meter Pressure vs Flowrate



Console Serial:

A2204323

WISDOM SCIENCE

Console Model:

XC-572-OV

บริษัท วิสโดม ไซนส์ แอนด์ เซอร์วิส กรุ๊ป จำกัด  
WISDOM SCIENCE SALE AND SERVICE GROUP COMPANY LIMITED

**COPY**

**DRY GAS METER XC572V**

**Serial No. : 1110070**

## Certificate Of Calibration

Method 5 Pre-Test Console Calibration - Cubic meter (m3)

## Meter Console Information

Console Model : XC572V  
 Console serial : 1110070  
 DGM Model #: SK25EX  
 DGM Serial #: 0005413

## Calibration Condition

Calibration Date: 3-Jul-23  
 Due Date: 2-Jul-24  
 Cal. Report No.: WDS-SV660107  
 Ambient Temp (°C): 25  
 Pressure (mm Hg): 758  
 Relative Humidity (%): 60

## Factors/Conversion

Std. Temp. (°K): 298  
 Std. Pressure (mm Hg): 760  
 K<sub>1</sub> (K/mm Hg): 0.3857

## Reference Equipment

WTM Model: W-NKoDa-5B WTM Cal. Due Date: Nov. 2022  
 WTM Serial: 600245 Gamma: 1.0000

## UUT Meter (DGM)

Run Time (minutes)	DGM Orifice (mm H <sub>2</sub> O)	Volume		Outlet Temp		Volume		Outlet Temp	
		Initial	Final	Initial	Final	Initial	Final	Initial	Final
15.00	13.0	599.3828	599.5462	27	27	20.05690	20.22163	28	27
10.00	25.0	599.5689	599.7246	27	26	20.24425	20.39999	27	27
8.00	50.0	599.7405	599.9176	26	26	20.41592	20.59344	27	27
7.00	80.0	599.9333	600.1337	26	26	20.60920	20.81034	27	27
5.00	120.0	600.1559	600.3319	26	26	20.83271	21.00950	27	27

## Reference Meter (WTM)

## Standardized Data

## Calibration Results

Test Meter		Reference Meter		Correction Factor		Flow Rate		ΔH@ (mm H <sub>2</sub> O)	
Std. Volume	Std. Flow Rate	Std. Volume	Std. Flow Rate	"Gamma"	Variation	Std & Corr	0.0212 SCMM	Variation	
V <sub>std</sub> (m <sup>3</sup> )	Q <sub>std</sub> m <sup>3</sup> /min	V <sub>ref</sub> (m <sup>3</sup> )	Q <sub>ref</sub> m <sup>3</sup> /min	(Y)	(ΔY)	Q <sub>ref</sub> (m <sup>3</sup> /min)	ΔH <sub>0</sub>	ΔΔH <sub>0</sub>	
0.159	0.011	0.160	0.011	1.005	0.010	0.011	50.181	2.747	
0.152	0.015	0.152	0.015	0.996	0.000	0.015	48.096	0.662	
0.174	0.022	0.173	0.022	0.995	-0.001	0.022	47.605	0.171	
0.197	0.028	0.196	0.028	0.993	-0.003	0.028	45.688	-1.747	
0.174	0.035	0.172	0.034	0.990	-0.006	0.034	45.602	-1.832	
				0.996	= Y Avg.		47.434	= ΔH@ Avg	

Pass/Fail Result: **Pass**

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02  
 Note: For ΔH<sub>0</sub>, orifice pressure differential that equates to 0.75cfm (0.0212m<sup>3</sup>/min) at standard temperature and pressure. Acceptable tolerance of individual values from the average is ±0.2inches (5.1mm) H<sub>2</sub>O.

Approved By: \_\_\_\_\_

(Palpasu Chaisana)  
 Service Manager

Date: 3-Jul-23

บริษัท วิสโดม ไซนส์ แอนด์ เซอร์วิส กรุ๊ป จำกัด  
 WISDOM SCIENCE SALE AND SERVICE GROUP COMPANY LIMITED

COPY

## TEMPERATURE DISPLAY CALIBRATION

## Calibration Conditions

Cal. Date: 3-Jul-23 Temp. Simulator Model: FLUKE 714B  
 Due Date: 2-Jul-24 Serial No.: 60590035  
 Cal. Report No.: WDS-SV660107  
 Ambient Temp. (°C): 25  
 Pressure (mm Hg): 758  
 Humidity (%): 60

## Meter Console Information

Console Model: XC572V  
 Console serial: 1110070  
 Temp. Indicator Model: 766-KF  
 Temp. Indicator Serial: JC17852

## Temperature Sensor Calibration

Reference Point	Ref Thermometer Temperature °C	Thermocouple Display Temperature °C	Temperature Difference °C
#			
1	-18.0	-17.0	1.0
2	38.0	37.0	1.0
3	93.0	93.0	0.0
4	149.0	149.0	0.0
5	260.0	259.0	1.0
6	371.0	372.0	-1.0
7	482.0	482.0	0.0
8	593.0	594.0	-1.0
9	816.0	816.0	0.0
10	1038.0	1039.0	-1.0
Maximum <sup>1</sup>			1.0

PASS

## Note

<sup>1</sup> For valid test results, the maximum difference between temperature readings should ≤1.0°C (EPA Method 5, Section 6.1.1.8).  
 Perform all TC Channel calibrations. Except meter (DGM) channel

## DGM Out Temperature Sensor Calibration

Temperature point	Ref Thermometer Temperature °C	Thermocouple Display Temperature °C	Temperature Difference °C
#			
Ambient	26.5	27.0	-0.5
Heat	100.5	102.5	-2.0

DGM Out Temp. Diff. ±3 °C

PASS

Approved By: \_\_\_\_\_

Palpasu Chaisana  
 Service Manager  
 WISDOM SCIENCE

บริษัท วิสโดม ไซนส์ แอนด์ เซอร์วิส กรุ๊ป จำกัด  
 WISDOM SCIENCE SALE AND SERVICE GROUP COMPANY LIMITED

COPY

WISDOM SCIENCE SALE AND SERVICE GROUP COMPANY LIMITED  
 Address 9/115 Lumpini Town Ville Ratchaphruek-Pinklao Village No. 4, Bang Khanun, Bang Krui, Nonthaburi 11130 Thailand  
 Tel. 090-860-1392, 084-599-1944, 084-704-1620



WISDOM SCIENCE

## ELAPSED TIMER CALIBRATION

### Meter Console Information

Model #: XC572V  
Serial #: 1110070  
Elapsed Timer Model #: C342-1464  
Elapsed Timer Serial #: -

### Calibration Conditions

Cal. Date : 03-Jul-23  
Due Date : 02-Jul-24  
Cal. Report No. : WDS-SV660107  
Ambient Temp. (°C) : 25  
Pressure (mm Hg) : 758  
Humidity (%) : 60

### Reference Equipment

Calibration Standard: JS-307  
Method Reference: Compare

Run Time Elapsed STD.	Calibration Results				Average Time	Deviation
	1	2	3	4		
Minute	Minute	Minute	Minute	Minute	Minute	Minute
2.00	2.00	2.00	2.00	2.00	2.000	0.000
3.00	3.00	3.00	3.00	3.00	3.000	0.000
5.00	5.00	5.00	5.00	5.00	5.000	0.000
7.00	7.00	7.00	7.00	7.00	7.000	0.000
9.00	9.00	9.00	9.00	9.00	9.000	0.000

Approved By

( Patpasu Chalsana )  
Service Engineer

**WISDOM  
SCIENCE**

บริษัท วิสโดม เซ็นเซอร์ แอนด์ เซอร์วิส จำกัด  
WISDOM SCIENCE SENSORS AND SERVICE GROUP COMPANY LIMITED

**COPY**

WISDOM SCIENCE SALE AND SERVICE GROUP COMPANY LIMITED  
Address 9/115 Lumpini Town, Villa Radchabutrak-Pinkao Village, No. 4, Bang Kruai, Bang Kruai, Nonthaburi 11130 Thailand  
Tel. 080-460-1382, 084-084-1544, 084-084-1620

**Flue gas Analyzer**  
**Testo 350 NEW**  
**Serial No. 63455658/0722**



# Calibration Certificate

Certificate No.: G 660488  
Date of issue : 17-Aug-23

Instrument description : Flue Gas Analyzer  
Instrument model : Testo 350 New  
Instrument serial no. : 63455658/0722  
Control unit serial no. : 03601409/0722  
ID no. or control no. :  
Manufacturer : Testo SE & Co. KGaA  
Probe description :  
Probe model :  
Probe serial :  
Customer name : Eastern Thai Consulting 1992 Company Limited  
Customer address : 683 Moo 11, Sukhapibarn 8 Road, Nongkham, Si Racha, Chon Buri 20280

Total pages of certificate : 2 Pages  
Receiving no. : L-232624  
Receiving date : 10-Aug-23  
Parameter of calibration : Gas Calibration(Oxygen 2.498,10.04,21.02 %Vol, Carbon Monoxide 80.14,302,1003 ppm, Nitrogen Dioxide 80.96 ppm, Nitric Oxide 151.5 ppm, Sulphur Dioxide 100.8 ppm)  
Used :  
Condition of UUC :  
Ambient condition : All of the Measurement were carried out the stabilized laboratory  
Temperature : 23 ±5 °C  
Humidity : 55 ± 15 %RH  
Calibration place : 17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210  
Calibration procedure no. : This instrument was calibrated by comparison with Standard gas mixture according to calibration work instration no. WI-CL-28-C

The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.  
This certificate is applied only to item under test. Environmental condition.  
This Calibration Certificate may not be reproduced other than in full except with the permission of the issuing laboratory.  
Calibration certificates without signature and seal not valid and The results relate only to the items tested/calibrated.  
This calibration certificate documents are traceability to national standards, which realize measurement according to the International System of Units (SI).

Date of calibration : 17-Aug-23

*Kwanphong K.*

Mr. Kwanthai Khamdoung  
Calibration Technician

Mrs. Nongluck Wongsettee  
Technical Manager

COPY



# Calibration Certificate

Certificate No.: G 660488

## Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O <sub>2</sub> ) 2.498 % Vol	4219/21	Linde	30-Sep-25
Oxygen (O <sub>2</sub> ) 10.04 % Vol	CG-0153-21	Linde	18-Nov-26
Oxygen (O <sub>2</sub> ) 21.02 % Vol	CG-0041-22	Nimt	10-Feb-27
Carbon monoxide (CO) 80.14 ppm	CG-0040-22	Nimt	14-Feb-27
Carbon monoxide (CO) 302 ppm	1915/23	Linde	16-Jun-25
Carbon monoxide (CO) 1003 ppm	2583/22	Linde	09-Aug-24
Nitrogen Dioxide (NO <sub>2</sub> ) 80.96 ppm	3240/21	Linde	26-Jun-24
Nitric Oxide (NO) 151.5 ppm	0161/23	Linde	22-Jan-25
Sulphur Dioxide (SO <sub>2</sub> ) 100.8 ppm	3507/22	Linde	09-Nov-24

## Measured room conditions

Temperature : 23.5 °C Humidity : 61.2 %RH Pressure : 1009.5 mbar  
Calibration conditions  
Gas Temperature : 24 °C Flow rate : 1,300 ml/min Gas pressure : 1016.4 mbar

## Calibration Results (Without adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O <sub>2</sub> (%Vol)	2.498	7.58	0.082	0.15
O <sub>2</sub> (%Vol)	10.04	10.10	0.06	0.20
O <sub>2</sub> (%Vol)	21.02	21.11	0.09	0.30
CO (ppm)	80.14	80	-0.14	3.0
CO (ppm)	302	301	-1	6.0
CO (ppm)	1003	997	-6	12
*NO <sub>2</sub> (ppm)	80.96	80.3	-0.66	8.0
*NO (ppm)	151.5	153	1.5	8.0
*SO <sub>2</sub> (ppm)	100.8	101	0.2	6.0

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

\* Calibrations marked Not TISI Accredited "in this Certificate have been included for completeness."

## End of Report

COPY

**Hot Air Oven**

**Model : UFE 500**

**Serial No. : G511.0182**



ASIA MEDICAL AND  
AGRICULTURAL LABORATORY  
AND RESEARCH CENTER

AMARC

## CERTIFICATE OF CALIBRATION

Certificate No. : 23-006679  
Sample Code : 23-02820-002

Page 1 of 3

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhaphan 8 Rd., Nongkham,  
Sriacha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.  
(Hot Lab)

Equipment : Temperature controlled enclosures (Hot air oven)  
Manufacturer : Memmert  
Model : UFE 500  
Serial No. : GS11.0182  
ID No. : LABE 17/4  
Date of Receipt : 20 January 2023  
Date of Calibration : 20 January 2023

### Condition of Calibration

1. Environment : 1.1 Ambient temperature : Maximum 27.9 °C : Minimum 25.3 °C  
: 1.2 Relative humidity : Maximum 50.9 % : Minimum 38.5 %  
: 1.3 Line voltage supplied : Maximum 221.9 VAC : Minimum 218.5 VAC

### 2. Calibration method

TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

### 3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Data Acquisition With Sensor (RTD-PH00)	LB-DA-11 (RTD-138 to RTD-146)	22-040309	21 April 2023

### 4. This certificate is traceable to the international system of unit (SI Unit).

The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

### 5. This result of calibration was found accurate as shown on date and place of calibration only.

### 6. Condition of calibration item : Normal

Calibrated by

Mr. Sarawoot Thammoo

Scientist

Issue date

24 January 2023

Approved by

(Mr. Somchai Neampunt)

Signed for Director

COPY

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

361 Soi Ladprao 122, Ladprao Road, Phlabphla, Wang Thonglang, Bangkok 10310

TEL 02-516-2422 FAX 02-516-6949

CONTACT@AMARC.CO.TH WWW.AMARC.CO.TH Effective Date 15/01



ASIA MEDICAL AND  
AGRICULTURAL LABORATORY  
AND RESEARCH CENTER

AMARC

## REPORT OF CALIBRATION

Certificate No. : 23-006679  
Sample Code : 23-02820-002

Page 2 of 3

### Results of Calibration

Resolution : 0.5 °C

### 1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C)	UUC* reading (°C)	Measured temperature at each positions (°C)									Uncertainty ± (°C)	Coverage factor k
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9 <sup>Ref</sup>		
104	103.5	103.5	104.10	104.08	103.87	103.99	104.08	104.08	103.96	104.01	103.84	0.47	2.00

### 2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
104.0	0.08	0.32	0.39

### Notes

UUC\* = Unit Under Calibration

COPY

361 Soi Ladprao 122, Ladprao Road, Phlabphla, Wang Thonglang, Bangkok 10310  
TEL 02-516-2422 FAX 02-516-6949  
CONTACT@AMARC.CO.TH WWW.AMARC.CO.TH Effective Date 15/01



## REPORT OF CALIBRATION

Page 3 of 3

Certificate No. : 23-006679

Sample Code : 23-02820-002

## Results of Calibration

## Notes

1. Sensor installation locations
  - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
  - 1.2 The reference sensor is preferably located of the geometric center of the chamber.
2. Interior dimensions approx of chamber :  
W = 56 cm ; D = 40 cm ; H = 48 cm
3. Air valve or fresh air level : Off
4. Fan level : Open
5. The quoted uncertainty includes "Stability of chamber and loading effect in chamber at 20% of uniformity".
6. 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.
7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.
8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.
9. UUC\* reading - the average reading of indicating device that forms the integral part of the enclosure.
10. Calibration results without adjustment.

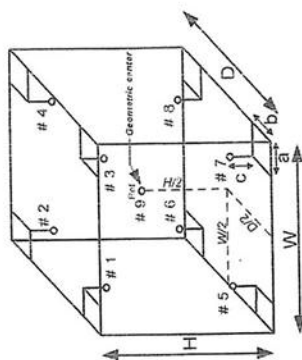


Figure: Example of sensor installation Positions

- End of Report -

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

COPY

**INDUCTIBELY COUPLED PLASMA SPECTROMETER**

**Model : Prodigy 7**

**Serial No. : P70177**



## Preventive Maintenance Report

Customer Name:	Eastern Thai Consulting 1992 Co., Ltd	Date: Dec 13, 2023
Instrument/Equipment:	ICP-OES	Model: Prodigy 7
Brand:	Teledyne Leeman Labs	S/N: P70177

1. Gas Supply / Water Chiller / Exhaust Hood:		Status
Gas systems:		
Argon Pressure (85-95 psi):	90 psi	OK <input checked="" type="checkbox"/>
Nitrogen Pressure (85-95 psi):	- psi	OK <input checked="" type="checkbox"/> use Ar.
No leak inspected		OK <input checked="" type="checkbox"/>
Replace camera purge gas Dehydrator		
Water Chiller for RF generator		
Minimum flowrate detected		OK <input checked="" type="checkbox"/>
No leak inspected		OK <input checked="" type="checkbox"/>
Water Chiller for Detector		
Check water level and refill		OK <input checked="" type="checkbox"/>
Change water		OK <input checked="" type="checkbox"/>
Temperature: 25 °C		OK <input checked="" type="checkbox"/>
Exhaust Hood:		
Minimum Air flowrate checked		OK <input checked="" type="checkbox"/>

2. Spectrometer		Status
Optical view position		
Axial peak positions	x 332.5 y 49.05	OK <input checked="" type="checkbox"/>
Radial peak positions	x 49.06 y 422.0	OK <input checked="" type="checkbox"/>
Hg lamp peak positions	x 224.5 y 241.5	OK <input checked="" type="checkbox"/>
Wavelength Calibrate with HG Lamp		
Full Frame Image		OK <input checked="" type="checkbox"/>
Temperature controlled 31 °C		OK <input checked="" type="checkbox"/>
Purge gas flow control Low/High		OK <input checked="" type="checkbox"/>
Purge gas flow for Detector		OK <input checked="" type="checkbox"/>
Camera Support Module		OK <input checked="" type="checkbox"/>

Engineer Sign

*[Signature]*  
**COPY**



## Instrument Performance Certificate

For ICP-OES

PRODUCT ID  
Serial Number

Prodigy 7, Teledyne Leeman Labs  
P70177

Customer Name  
Address

EASTERN THAI CONSULTING 1992 CO., LTD.  
999 Moo 11 Tambon Nong Kham, Amphoe Si Racha,  
Chonburi 20230

Date of Qualified  
Next Due date

Dec 13, 2023  
May 13, 2024

This certifies for products which was performed in acceptable criteria specifications

Gas supply / Water chiller / Exhaust hood PASSED  
Cooling Systems PASSED  
Spectrometer PASSED  
RF Generator PASSED  
Sample Introduction & Autosampler PASSED  
Software & Computer PASSED  
Hardware Diagnostics Test PASSED  
Analytical Test PASSED

Provided by

Scientist Instrument Co., Ltd.  
113 Soi Ekachai 44, Ekachai Road  
Khlong Bang Phran, Bangkok  
Bangkok 10150 Thailand

Certified by

*[Signature]*  
Thunraphol Sakdayos  
Service Engineer

**COPY**

3.RF Generator		Status
Plasma Control	Auto Start	OK <input checked="" type="checkbox"/>
	Extinguish	OK <input checked="" type="checkbox"/>
	RF power setting	OK <input checked="" type="checkbox"/>
	Igniter	OK <input checked="" type="checkbox"/>
Coolant /Plasma Flow control	Air Knife	OK <input checked="" type="checkbox"/>
	Aux Flow	OK <input checked="" type="checkbox"/>
	Aux Flow	OK <input checked="" type="checkbox"/>
	Optimize sample introduction function	OK <input checked="" type="checkbox"/>
4.Sample Introduction & Autosampler		Status
Plasma torch	Plasma Torch	OK <input checked="" type="checkbox"/>
	Spray chamber	OK <input checked="" type="checkbox"/>
	Injector	OK <input checked="" type="checkbox"/>
	Nebulizer pressure	OK <input checked="" type="checkbox"/>
Peristaltic pump and control	Speed control	OK <input checked="" type="checkbox"/>
	Sample tubing	OK <input checked="" type="checkbox"/>
	Drain tubing	OK <input checked="" type="checkbox"/>
	Drain tubing	OK <input checked="" type="checkbox"/>
Autosampler Control	Position movement	<input type="checkbox"/> Available <input checked="" type="checkbox"/> Not Available
	Drain tubing	OK <input type="checkbox"/>
	Auto Rinse	OK <input type="checkbox"/>
	Auto Rinse	OK <input type="checkbox"/>
5.Computer & Software Check:		Status
Software	Interface Cable USB	OK <input checked="" type="checkbox"/>
	Version 5.2	OK <input checked="" type="checkbox"/>
	Operation function check :	OK <input checked="" type="checkbox"/>
	Open /Save /Edit method	OK <input checked="" type="checkbox"/>
Auto alignment /Hg alignment	Instrument Control	OK <input checked="" type="checkbox"/>
	Sequence	OK <input checked="" type="checkbox"/>
	Full Frame Capture	OK <input checked="" type="checkbox"/>
	Auto alignment /Hg alignment	OK <input checked="" type="checkbox"/>
Calibration Curve	Re-Calculation	OK <input checked="" type="checkbox"/>
	Re-Calculation	OK <input checked="" type="checkbox"/>
	Print Report	OK <input checked="" type="checkbox"/>
	Print Report	OK <input checked="" type="checkbox"/>

Engineer Sign

*Signature*

6.Hardware Diagnostics Test				Status
Power Supply	-12 VDC (+/- 5 %)	-12.5 V	V	Passed <input checked="" type="checkbox"/>
	+12 VDC (+/- 5 %)	11.91 V	V	Passed <input checked="" type="checkbox"/>
	+3.3VDC (+/- 5 %)	3.3 V	V	Passed <input checked="" type="checkbox"/>
	+5.0 VDC (+/- 5 %)	4.945 V	V	Passed <input checked="" type="checkbox"/>
Plasma Generator	+13.5 VDC (+/- 5 %)	13.41 V	V	Passed <input checked="" type="checkbox"/>
	ICP Current 0.500A = 1kW	0.502 A	A	Passed <input checked="" type="checkbox"/>
	ICP Ref 5.0Vdc = 1kW	5.002 V	V	Passed <input checked="" type="checkbox"/>
	ICP Current 0.00 Vdc = 0kW	0 A	A	Passed <input checked="" type="checkbox"/>
RF Water (Hz) OFF (1 Hz)	ICP Ref 0.00Vdc = 0kW	0 V	V	Passed <input checked="" type="checkbox"/>
	RF Water (Hz) ON (25-35 Hz)	0 Hz	Hz	Passed <input checked="" type="checkbox"/>
	RF Water (Hz) OFF (1 Hz)	25 Hz	Hz	Passed <input checked="" type="checkbox"/>
	Air Knife Pres. (0.00V ) OFF	0 V	V	Passed <input checked="" type="checkbox"/>
Air Knife Pres. (3.0 – 7.0 V) ON	Air Knife Pres. (3.0 – 7.0 V) ON	3.36 V	V	Passed <input checked="" type="checkbox"/>
	Neb setting to 25 psi	reading 25 psi	psi	Passed <input checked="" type="checkbox"/>
	Cool setting to 16 lpm	reading 16 lpm	lpm	Passed <input checked="" type="checkbox"/>
	Aux setting to 0.5 lpm	reading 0.5 lpm	lpm	Passed <input checked="" type="checkbox"/>
Camera Water pump				
Pump Current (0.000 A) OFF	Pump Current (0.000 A) OFF	0 A	A	Passed <input checked="" type="checkbox"/>
	Pump Voltage (0.000 V) OFF	0 V	V	Passed <input checked="" type="checkbox"/>
	Pump Current (0.8 to 4.0A) ON	1.1 A	A	Passed <input checked="" type="checkbox"/>
	Pump Voltage (8 to 13 V) ON	12.43 V	V	Passed <input checked="" type="checkbox"/>
Set Points	Cam Tec Temperature (-30 to -38°C)	Set -32 °C	Read -31 °C	Passed <input checked="" type="checkbox"/>
	Op Purge Low (0-15.5 lpm)	Set 5 lpm	Read 5.1 lpm	Passed <input checked="" type="checkbox"/>
	Op Purge High (0-15.5 lpm)	Set 10 lpm	Read 10.1 lpm	Passed <input checked="" type="checkbox"/>
	Cam Wtr T (25-30 °C)	Set 25 °C	Read 25 °C	Passed <input checked="" type="checkbox"/>

7.Cleaning & Replacement		Status
O-Ring Torch replacement	OK	✓
Pump Tubing replacement	OK	✓
Glassware cleaning	OK	✓
Lubricate the roll peristaltic pump	OK	✓
Optical windows cleaning	OK	✓
Change & refilled Detector water chiller	OK	✓
Change & refilled RF Generator water Chiller	OK	✓
Clean All Electronics Board	OK	✓



Engineer Sign

*Signature*

**COPY**

8. Safety Interlock		Status
Argon pressure	OK ✓	
Air Knife	OK ✓	
RF power regulator	OK ✓	
RF power temp	OK ✓	
RF power current	OK ✓	
RF water	OK ✓	
Oscillator cover	OK ✓	
Door switch	OK ✓	
Camera purge	OK ✓	
Camera TE cooler	OK ✓	
Water chiller	OK ✓	
Heater Fans	OK ✓	

9. Analytical Test		Details	Status
Method name	SRM Standard	Mn Setup	
Calibration curve type		Mn	
		Linear	
		Rho	
		Element	
		Mn	
		QC standard Check	OK

Customer Sign	Engineer Sign
	 13/12/2023

**COPY**

**SOUND LEVEL CALIBRATOR**

**MODEL : NC-75**

**SERIAL No. : 34302326**

SITHIPORN ASSOCIATES CO.,LTD.  
CALIBRATION LABORATORY



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

Cert. No. : ACC23013  
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR

Manufacturer : RION

Model : NC-75

Serial No.: 34302326

ID No.: -

Condition As Found : GOOD

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.  
SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,  
NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND.

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

Received Date : 10 MAY 2023  
Calibration Date : 19 MAY 2023  
Date of Issue : 24 MAY 2023

Calibrated by :

Nathakorn Pisutpaisan

Approved by :

*T. Petchurai*  
( Thanakul Petchurai )

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

*SITHIPORN*  
COPY

SITHIPORN ASSOCIATES CO.,LTD.  
CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACC23013  
Job No. : VC66AC0058  
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

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

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

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL-BP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL-BP 30/0267	13-FEB-24
Digital Multimeter	33461A	MY60024273	EEL-BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAI	34560495	AA-3002-23	14-FEB-24
Audio Analyzer	AVR-3360A	V744B6069	EF-0012-23	10-FEB-24

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

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

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

*SITHIPORN*  
COPY

Continuation of Calibration Certificate

Cert. No. : ACC23013  
Job No. : VC66AC0058  
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
94	94.03	0.03	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Acceptance limit (%)
1000	1000.0	0.0	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Acceptance limit (%)
0.32	0.10	3.0

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

End of Calibration Certificate

COPY

**SOUND LEVEL METER**

**MODEL : NL-52A**

**SERIAL No. : 01120943**



## Calibration Certificate

**Equipment :** SOUND LEVEL METER  
**Manufacturer :** RION  
**Model :** NL-52A / Microphone UC-59 / Preamplifier NH-25  
**Serial No.:** 01120943 / 22778 / 22431  
**ID No.:** -

**Condition As Found :** GOOD

**Customer :** EASTERN THAI CONSULTING 1992 CO., LTD.  
SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,  
NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND.

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

**Received Date :** 11 JANUARY 2024  
**Calibration Date :** 16 - 17 JANUARY 2024  
**Date of Issue :** 18 JANUARY 2024

**Calibrated by :** Nathakorn Pisutpaisan

**Approved by :**   
( Thanakul Petchurai )

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

**COPY**



**Calibration Procedure :** CP-AC-01

### Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).  
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

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

### Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL.BP 300266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL.BP 290266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EEL.BP 310266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KA1	34560495	AA-3002-23	14-FEB-24

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

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

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

**COPY**



Summary of Measurement Result :

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

COPY

T. Petch

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal ( dB )	Measured Value ( dB )	Deviation ( dB )	Acceptance Limit ( dB )
93.9 (93.98)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value ( dB )
13.8

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

Frequency Weighting	Measured value ( dB )
A - weight	8.7
C - weight	14.2
Flat	19.9

3. Acoustical signal tests of frequency weightings

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

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)		
	Flat	C-weight	A-weight
125	0.2	0.2	0.2
1000	0.1	0.1	0.1
8000	0.2	0.3	0.3
			Acceptance Limits
			± 1.0
			± 0.7
			+ 1.5, - 2.5

COPY

T. Petch

#### 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)		
	Flat	A-weight	Acceptance Limits
63	0.0	0.0	±1.0
125	0.0	0.0	±1.0
250	0.0	-0.1	±1.0
500	0.0	-0.1	±1.0
1000	0.0	0.0	±1.0
2000	0.0	0.0	±1.0
4000	0.0	0.0	±1.0
8000	0.0	0.1	+ 1.5, - 2.5
16000	0.0	-1.2	+ 2.5, -16.0

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

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

#### 6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.1

#### 7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±0.8
136.0	136.0	0.0	±0.8
135.0	135.0	0.0	±0.8
134.0	134.0	0.0	±0.8
133.0	133.0	0.0	±0.8
132.0	132.0	0.0	±0.8
131.0	131.0	0.0	±0.8
129.0	129.0	0.0	±0.8
124.0	124.0	0.0	±0.8
119.0	119.0	0.0	±0.8
114.0	114.0	0.0	±0.8
109.0	109.0	0.0	±0.8
104.0	104.0	0.0	±0.8
99.0	99.0	0.0	±0.8
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	34.0	0.0	±0.8
30.0	30.0	0.0	±0.8
29.0	29.0	0.0	±0.8
28.0	28.0	0.0	±0.8
27.0	26.9	-0.1	±0.8
26.0	26.0	0.0	±0.8
25.0	24.9	-0.1	±0.8

**COPY**  
y. Petchw.

# 8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±0.8

# 9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.0 ; -3.0
	2	8	117.0	117.0	0.0	1.0 ; -1.5
	200	800	134.0	134.0	0.0	±0.5
Slow	2	8	108.0	108.0	0.0	1.0 ; -3.0
	200	800	127.6	127.6	0.0	±0.5
	0.25	1	99.0	98.9	-0.1	1.0 ; -3.0
SEL	2	8	108.0	108.0	0.0	1.0 ; -1.5
	200	800	128.0	128.0	0.0	±0.5

# 10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L <sub>peak</sub> (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
One	136.4	135.4	-1.0	±2.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	132.9	-0.1	±1.0
Positive half cycle	135.4	135.1	-0.3	±1.0
Negative half cycle	135.4	135.1	-0.3	±1.0

# 11. Overload indication

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

# 12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.1

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

**End of Calibration Certificate**

**COPY**  
P. Retan.

**COPY**  
P. Retan.

**SOUND LEVEL METER**

**MODEL : NL-52A**

**SERIAL No. : 01120944**

Cert. No. : ACL24039  
Pages : 1 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-52A / Microphone UC-59 / Preamplifier NH-25  
Serial No.: 01120944 / 21950 / 22333  
ID No.: -

Condition As Found : GOOD

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.  
SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,  
NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND.

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

Received Date : 11 JANUARY 2024  
Calibration Date : 16 - 17 JANUARY 2024  
Date of Issue : 18 JANUARY 2024

Calibrated by : Nabakorn Pisutpaian

Approved by : *T. Petchurai*  
( Thanakul Petchurai )

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

COPY

COPY

T. Petchurai

Calibration Procedure : CP-AC-01

## Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).  
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

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

## Condition of this result of calibration :

1. Reference Standard Instruments :

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

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

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

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Cert. No. : ACL24039  
Job No. : VC67AC0042  
Pages : 3 of 8

**Summary of Measurement Result :**

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

**COPY**

7. Ketch.

Cert. No. : ACL24039  
Job No. : VC67AC0042  
Pages : 4 of 8

**Result of calibration :**

**1. Absolute sensitivity**

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	94.0	0.0	±0.3

**2. Self-generated noise**

**2.1 Normal test**

Measured Value (dB)
13.8

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

Frequency Weighting	Measured value (dB)
A - weight	9.9
C - weight	15.4
Flat	20.9

**3. Acoustical signal tests of frequency weightings**

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)		
	Flat	C-weight	A-weight
125	0.1	0.2	0.2
1000	0.1	0.1	0.1
8000	0.3	0.4	0.4
			Acceptance Limits
			± 1.0
			± 0.7
			+ 1.5, - 2.5

**COPY**

7. Ketch.

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency ( Hz )	Deviation from various frequency weighting response curve (dB)		
	Flat	C-weight	A-weight
63	0.0	0.0	0.0
125	0.0	0.1	0.0
250	0.0	0.0	0.0
500	0.0	0.1	0.0
1000	0.0	0.0	0.0
2000	0.0	0.1	0.0
4000	0.0	0.1	0.0
8000	0.1	0.1	0.1
16000	0.0	-1.2	-1.1

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long - term stability

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

7. Level linearity on the reference level range

Anticipated Value ( dB )	Measured Value ( dB )	Deviated Value ( dB )	Acceptance Limits ( dB )
137.0	137.1	0.1	±0.8
136.0	136.1	0.1	±0.8
135.0	135.1	0.1	±0.8
134.0	134.1	0.1	±0.8
133.0	133.0	0.0	±0.8
132.0	132.0	0.0	±0.8
131.0	131.0	0.0	±0.8
129.0	129.0	0.0	±0.8
124.0	124.0	0.0	±0.8
119.0	119.1	0.1	±0.8
114.0	114.0	0.0	±0.8
109.0	109.0	0.0	±0.8
104.0	104.1	0.1	±0.8
99.0	99.0	0.0	±0.8
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	34.0	0.0	±0.8
30.0	29.9	-0.1	±0.8
29.0	28.9	-0.1	±0.8
28.0	27.9	-0.1	±0.8
27.0	26.9	-0.1	±0.8
26.0	25.9	-0.1	±0.8
25.0	24.9	-0.1	±0.8

COPY

T. Petchw.

### 8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±0.8

### 9. Tone burst response

Time Weighting	Tone burst duration, T <sub>b</sub> (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.0 ; -3.0
	2	8	117.0	116.9	-0.1	1.0 ; -1.5
	200	800	134.0	134.0	0.0	±0.5
Slow	2	8	108.0	108.0	0.0	1.0 ; -3.0
	200	800	127.6	127.6	0.0	±0.5
	0.25	1	99.0	98.8	-0.2	1.0 ; -3.0
SEL	2	8	108.0	107.9	-0.1	1.0 ; -1.5
	200	800	128.0	128.0	0.0	±0.5

### 10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
One	136.4	136.2	-0.2	±2.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±1.0
Positive half cycle	135.4	135.1	-0.3	±1.0
Negative half cycle	135.4	135.1	-0.3	±1.0

### 11. Overload indication

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

### 12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.1

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

**End of Calibration Certificate**

**COPY**  
 7. Peterh.

**COPY**  
 7. Peterh.

**ANALYTICAL BALANCE (DU)**

**Model : XS205DU**

**Serial No. : 1126323724**



Certificate No. : 23-148799  
Sample Code : 23-56200-001

## CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapibarn 8 Rd., Nongkham,  
Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.  
(Analytical Balance Room)

Equipment : ELECTRONIC BALANCE

Manufacturer : METTLER TOLEDO

Model : XS205DU

Serial No. : 1126323724

ID No. : LABE 05/1

Date of Receipt : 22 December 2023

Date of Calibration : 22 December 2023

Calibrated by : Mr. Somwang Sangdee  
Scientist  
Approved by : (Mr. Somchai Neampunt)  
Signed for Director

Issue date : 25 December 2023

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).



Certificate No. : 23-148799  
Sample Code : 23-56200-001

## REPORT OF CALIBRATION

Equipment : ELECTRONIC BALANCE  
Manufacturer : METTLER TOLEDO  
Model : XS205DU  
Capacity : Max 81 g / 220 g  
Resolution : 0.01 mg / 0.1 mg  
Serial No. : 1126323724  
ID No. : LABE 05/1

### Result of Calibration

#### 1. Test weight and repeatability of reading

Repeatability is a measure of the ability of a balance to supply the same result in repetitive weighings with one and the same load under the same measurement condition. The measurement of the repeatability must include both the balance specifications and the ambient (vibration, fluctuating air current/temperature/humidity, etc.) Operator handling of the balance is also included in the standard deviation.

Unit : g	Range : 80	Before adjustment	After adjustment
<input type="checkbox"/> No adjustment	Nominal value	40 80 40 80	
<input checked="" type="checkbox"/> Adjustment	Standard weight	40.000054 80.000048 40.000054 80.000048	
	Average reading of indicator	40.000026 80.000037 40.000017 80.000017	
	Standard deviation	0.000015 0.000016 0.000008 0.000009	

Unit : g	Range : 200	Before adjustment	After adjustment
<input type="checkbox"/> No adjustment	Nominal value	100 200 100 200	
<input checked="" type="checkbox"/> Adjustment	Standard weight	100.000042 200.000041 100.000042 200.000041	
	Average reading of indicator	100.00003 200.00004 100.00001 200.00001	
	Standard deviation	0.000005 0.000005 0.000003 0.000005	





Certificate No. : 23-148799

Sample Code : 23-56200-001

## REPORT OF CALIBRATION

## Result of Calibration

## 2. Sensitivity or value of a scale division

Change in the output variable of a measuring instrument divided by the associated change in the input variable.

Unit : g

Range : 80		Range : 200	
Test Point	Sensitivity, S	Test Point	Sensitivity, S
0	1.00748	0	1.0274
40	0.98753	100	0.9975
80	0.99751	200	0.9975

## 3. Departure of indication from nominal value, Linearity

Unit : g

Nominal Value	Standard Value	Average Reading of Indicator	Correction Value	Expanded Uncertainty	Coverage Factor (k)
Unload	0.0000000	0.00000	0.00000	0.000012	2.05
0.01	0.0100025	0.01000	0.00000	0.000012	2.05
0.1	0.1000019	0.10001	-0.00001	0.000013	2.03
1	1.0000125	1.00001	0.00000	0.000015	2.02
5	5.0000208	5.00004	-0.00002	0.000021	2.00
10	10.0000004	10.00008	-0.00008	0.000026	2.00
20	20.0000030	20.00011	-0.00008	0.000036	2.00
50	50.000014	50.00014	-0.00013	0.000088	2.00
100	100.000042	100.00001	-0.00001	0.00016	2.00
150	150.000056	150.00001	0.00000	0.00022	2.00
200	200.000041	200.00002	-0.00002	0.00027	2.00

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

COPY



Certificate No. : 23-148799

Sample Code : 23-56200-001

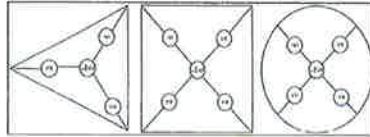
## REPORT OF CALIBRATION

## Result of Calibration :

## 4. Eccentric or off-centre loading

Deviation of the measurement value through off-center (eccentric) loading. The corner load increases with the weight of the load and its removal from the center of the pan support.

Weighing pan		Test weight : 50 and 100	
		Unit : g	
		Range	
		80	
		200	
Position	Reading of indicator	Reading of indicator	Reading of indicator
1	50.00015	100.0001	100.0001
2	50.00022	100.0001	100.0001
3	50.00008	100.0001	100.0001
4	50.00002	100.0000	100.0000
5	50.00016	100.0002	100.0002
6	50.00014	100.0001	100.0001
Maximum difference	0.00013	0.0001	0.0001



## Condition of Calibration

1. Calibration Method : W1-CL-004 base on UKAS LAB 14: 2019

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

3. Condition of Calibration tem: Normal

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

Through the reference standard laboratory of Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (instrument number 1).

5. Reference standard instrument :

Instrument	Class	ID No.	Certificate No.	Due Date
1) STANDARD WEIGHT 1 kg to 1 kg	E2	LB-WE-79	23-105642	10 September 2024

End of Report

COPY

**ANALYTICAL BALANCE**

**Model : SECURA224-1S**

**Serial No. : 0036707137**



Certificate No. : 23-148800  
Sample Code : 23-56200-002

Page 1 of 4

## CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapiarn 8 Rd., Nongkham,  
Sriacha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.  
(Analytical Balance Room)

Equipment : ELECTRONIC BALANCE

Manufacturer : SARTORIUS

Model : SECURA224-1S

Serial No. : 0036707137

ID No. : LABE 05/2

Date of Receipt : 22 December 2023

Date of Calibration : 22 December 2023

Calibrated by Mr. Somwang Sangdee  
Scientist

Issue date : 25 December 2023

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).



## REPORT OF CALIBRATION

Equipment : ELECTRONIC BALANCE  
Manufacturer : SARTORIUS  
Model : SECURA224-1S  
Capacity : Max 220 g  
Resolution : 0.0001 g  
Serial No. : 0036707137  
ID No. : LABE 05/2

### Result of Calibration

#### 1. Test weight and repeatability of reading

Repeatability is a measure of the ability of a balance to supply the same result in repetitive weighings with one and the same load under the same measurement condition. The measurement of the repeatability must include both the balance specifications and the ambient (vibration, fluctuating air current/temperature/humidity, etc.) Operator handling of the balance is also included in the standard deviation.

Unit : g	Range : 220	Before adjustment	After adjustment
<input type="checkbox"/> No adjustment	Nominal value	100 200 100 200	100 200
<input checked="" type="checkbox"/> Adjustment	Standard weight	100.000042 200.000041 100.000042 200.000041	100.000041 200.000041
	Average reading of indicator	99.9998 199.9998	100.0000 200.0000
	Standard deviation	0.00006 0.00007	0.00003 0.00007

Unit :	Range :	Before adjustment	After adjustment
<input type="checkbox"/> No adjustment	Nominal value	*	*
<input type="checkbox"/> Adjustment	Standard weight	*	*
	Average reading of indicator	*	*
	Standard deviation	*	*

COPY

Certificate No. : 23-148800

Sample Code : 23-56200-002

## REPORT OF CALIBRATION

## Result of Calibration

## 2. Sensitivity or value of a scale division

Change in the output variable of a measuring instrument divided by the associated change in the input variable.

Unit : g

Range : 220

Test Point	Sensitivity, S	Test Point	Sensitivity, S
0	0.7980	-	-
100	0.8978	-	-
200	0.8978	-	-

## 3. Departure of indication from nominal value, Linearity

Unit : g

Nominal Value	Standard Value	Average Reading of Indicator	Correction Value	Expanded Uncertainty	Coverage Factor (k)
Unload	0.0000000	0.0000	0.0000	0.000086	2.00
0.01	0.0100025	0.0100	0.0000	0.000086	2.00
0.1	0.1000019	0.1000	0.0000	0.000087	2.00
1	1.0000125	1.0000	0.0000	0.000087	2.00
2	2.0000089	2.0000	0.0000	0.000087	2.00
5	5.0000208	5.0001	-0.0001	0.000088	2.00
10	10.000004	10.0000	0.0000	0.000090	2.00
20	20.000030	20.0000	0.0000	0.000093	2.00
50	50.000014	50.0000	0.0000	0.00011	2.00
100	100.000042	100.0000	0.0000	0.00016	2.00
200	200.000041	200.0000	0.0000	0.00028	2.00

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

COPY

Certificate No. : 23-148800

Sample Code : 23-56200-002

## REPORT OF CALIBRATION

## Result of Calibration :

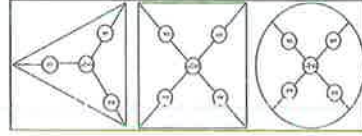
## 4. Eccentric or off-centre loading

Deviation of the measurement value through off - center (eccentric) loading. The corner load increases with the weight of the load and its removal from the center of the pan support.

Range	Position	Reading of indicator	Reading of indicator
1	100.0000	-	-
2	100.0000	-	-
3	100.0000	-	-
4	99.9999	-	-
5	100.0000	-	-
6	100.0000	-	-
Maximum difference	0.0001	-	-

Weighting pan : ☒ Circle  
☐ Triangular  
☐ Rectangular

Test weight : 100  
Unit : g



## Condition of Calibration

1. Calibration Method : WI-CL-004 base on UKAS LAB 14: 2019	Ambient conditions	Min	Max
2. This result of calibration was found accurate as shown on date and place of calibration only.	Temperature (°C)	24.4	24.8
3. Condition of Calibration item: Norma	Relative Humidity (%Rh)	39.9	41.1
4. This certification is traceable to the International System of Unit maintained at : *	Air pressure (hPa)	1012.2	1012.8

Through the reference standard laboratory of Asia Medical and Agricultural Laboratory and Research Center Public

Company Limited (Instrument number : 1)

5. Reference standard instrument :

Instrument

1) STANDARD WEIGHT 1 mg to 1 kg

Class : E2

ID No. : LB-WF-79

Certificate No. : 23-105642

Due Date : 10 September 2024

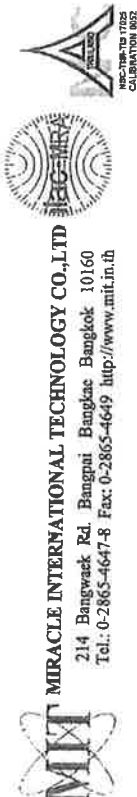
End of Report -

COPY

## **BAROMETER**

**Equipment : Analog Barometer**

**ID No. / Tag No. : BM001/41**



MIRACLE INTERNATIONAL TECHNOLOGY CO., LTD.  
214 Bangwaek Rd. Bangnai Bangkok 10160  
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



## CALIBRATION CERTIFICATE

Certificate No. : L202305085-002  
Date Issued : 16-May-23

**Customer** : Eastern Thai Consulting 1992 Co., Ltd.  
683 Moo 11 Sukhapibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

**Equipment** : Analog Barometer

**Manufacturer** : Barigo  
**Model** : -  
**Serial No.** : -  
**ID No./Tag No.** : BM001/41  
**Date Received** : 11-May-23  
**Date Calibrated** : 15-May-23  
**Calibrated by** : Mr. Jame Khaothong

**Calibration Method or Calibration Procedure Used**

In-house method : CP-21 base on DKD-R 6-1: Edition 3 2014.

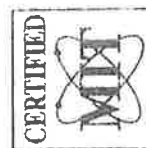
This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

### Result of Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level confidence approximately 95 percent.

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

Approved by: *Sarayuth T.*  
(Mr. Sarayuth Tochua)



Page 1 of 2

Certificate No : L202305085-002  
Environment : Ambient Temperature :  $(25 \pm 2)^{\circ}\text{C}$   
Relative Humidity :  $(50 \pm 15)\%\text{RH}$

STD Reading mbar	UUC Reading (mbar) Before Adjusted	UUC Reading (mbar) After Adjusted	UUC Error mbar	Uncertainty $\pm$ mbar
990.00	990.0	-	0.00	0.61
1000.00	1000.0	-	0.00	0.61
1010.00	1010.0	-	0.00	0.61
1020.00	1020.0	-	0.00	0.61
1030.00	1030.0	-	0.00	0.61

STD = Standard

UUC = Unit Under Calibration

Calibrated condition :

Pressure Medium : Air : Density =  $1.19 \text{ kg/m}^3$  @  $20^{\circ}\text{C}$ , 1 bar  
Mounting Position : Vertical  
Reference Level : at center of its dial  
Conversion Factor : Multiply by  $1.0 \text{ E}+02$  - Pa unit

Description of UUC :

Range : 990 - 1030 mbar Absolute  
Calibration Range : 990 - 1030 mbar Absolute  
Scale Interval : 1 mbar  
Resolution : 0.5 mbar Absolute

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

IRPC Certificate No. CL1-P220104 for Reference Pressure Monitor Serial No. 1598, Due 11-Nov-23

End of Certificate

Page 2 of 2

COPY

COPY

**BOD INCUBATOR**

**Model : TC445S**

**Serial No. : 0223/007275**

**SK**

S K SALES AND SERVICE CO.,LTD.  
194/56, 194/57 Thakham Rd. Sornae Dam  
Bang Khun Thien Bangkok 10150  
Tel : 02-417-2144 Fax : 02-417-2155



## Certificate of Calibration

Reference No. : C03190/2309-025  
Customer : Eastern Thai Consulting 1992 Co.,Ltd.  
683 Moo 11, Sukhaphiban 8, Tambol Nongkham,  
Siraacha District, Chonburi 20230, Thailand

Equipment : Incubator  
Manufacturer : Lovibond  
Model : TC445S  
Serial No. : 0223/007275  
ID No. :  
Received Date : 15 September 2023  
Calibrated Date : 15 September 2023  
Issued Date : 18 September 2023  
Environment :

	Minimum Value	Maximum Value
Ambient Temperature ( °C )	27.5	28.1
Relative Humidity ( % RH )	57	58
AC Line Voltage ( VAC )	224	226

Place Of Calibration : Production Line  
Calibrated by : Mr. Teerasak Chalyaporn

### Calibration Method

In-house method : SK-WI-23 base on Thai Laboratory Accreditation Scheme Publication Reference G-20

### Condition of this result of calibration

- Reference standard instrument
 

Instrument	Serial No.	Certificate No.	Due Date
1) Data acquisition/Switch unit	MY44047397	L2305-268	4 November 2023
2) Multiplexer Module	MY41105123	L2305-268	4 November 2023
- This result of calibration was found accurate as shown on date and place of calibration only
- This certificate can be traceable to International System of Unit :

Through Thailand Institute of Scientific And Technological Research (TISTR)

Approved by

☒ Mr. Suphachai Saksi ☐ Mr. Phayak Toolit ☐ Miss Tantaraporn Petpong

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

This certificate may not be reproduced other than in full except with the prior written approval of the S K Sales And Service Company Limited

**COPY**

Certificate No. : S2309-3014

Page 2 of 2

Table1 General Information

Working Area ( W*L*H )	60 *56 *145 cm
Fresh Air	OFF

Table2 Chamber Performance

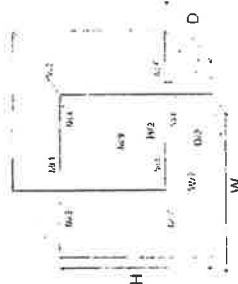
Setting Temperature ( °C )	Average Indicating Temperature ( °C )	Measured Stability ( ± °C )	Measured Uniformity ( °C )	Overall Variation ( °C )
20.0	20.0	0.37	0.64	0.98

Table3 Temperature Distribution

Setting Temperature ( °C )	Average Standard Reading ( °C )									Uncertainty ( ± °C )
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	
20.0	19.52	19.40	19.70	19.43	19.33	19.39	19.45	19.58	19.67	0.55

Resolution : 0.1 ( °C )

\* Probe No. 9 is Reference Probe



- Notes :
- The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
  - The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time
  - Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
  - The reported uncertainty of measurement were excluded Uniformity and Stability

\*\* End of Calibration Report \*\*

**COPY**

*[Signature]*

**BOD INCUBATOR**

**ID No. : LABE 19/5**

REPORT OF CALIBRATION

Results of Calibration

Resolution : 0.1 °C

1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C)	UUC* reading (°C)	Measured temperature at each positions (°C)								Uncertainty ± (°C)	Coverage factor k	
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8			# 9 <sup>Ref</sup>
20	20.0	20.0	20.06	19.92	19.96	19.89	19.93	20.08	19.97	19.79	19.86	0.42	2.00

2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
20	0.32	0.37	0.85

Notes

UUC\* = Unit Under Calibration

*[Signature]*

2. Calibration method  
TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Data Acquisition With Sensor (RTD-P100)	LB-DA-08	(RTD-239 to RTD-247)	22-077888
			09 August 2023

4. This certificate is traceable to the international system of unit (SI Unit).

The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

5. This result of calibration was found accurate as shown on date and place of calibration only.

6. Condition of calibration item : Normal

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapiban 8 Rd., Nongkham,  
Siracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.  
(Laboratory)

Equipment : Temperature controlled enclosures (Incubator)  
Manufacturer : Lovibond  
Model : Tc445S  
Serial No. : 0520/005227  
ID No. : LABE 19/5  
Date of Receipt : 21 April 2023  
Date of Calibration : 21 April 2023

Condition of Calibration  
1. Environment : Maximum 36.1 °C : Minimum 34.5 °C  
1.2 Relative humidity : Maximum 51.8 % : Minimum 49.3 %  
1.3 Line voltage supplied : Maximum 224.7 VAC : Minimum 221.9 VAC

Calibrated by

Mr. Sarawoot Thamno

Scientist

Approved by

(Mr. Somchai Neampunt)

Signed for Director

Issue date

24 April 2023

The uncertainties are for a confidence probability of approximately 95%.  
The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

361 Soi Ladprao 122, Ladprao Road,  
Phlabphla, Wang Thonglang, Bangkok 10310  
FW-CL-014

TEL 02-516-2472

FAX 02-516-6949

Rev 01

361 Soi Ladprao 122, Ladprao Road,  
Phlabphla, Wang Thonglang, Bangkok 10310  
FW-CL-014

TEL 02-516-2472

FAX 02-516-6949

Rev 05

CONTACT@AMARC.CO.TH

WWW.AMARC.CO.TH

Effective Date 15/10/21

COPY



NSC-TSI-11517025  
CALIBRATION0152

Page 3 of 3

## REPORT OF CALIBRATION

Certificate No. : 23-040768

Sample Code : 23-16178-002

### Results of Calibration

#### Notes

1. Sensor installation locations
  - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
  - 1.2 The reference sensor is preferably located of the geometric center of the chamber.
2. Interior dimensions approx of chamber :  
W = 60 cm ; D = 56 cm ; H = 146 cm
3. Air valve or fresh air level : Off
4. Fan level : Open
5. The quoted uncertainty includes "Stability of chamber and loading effect in chamber at 20% of uniformity".
6. 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.
7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.
8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.
9. UUC\* reading - the average reading of indicating device that forms the integral part of the enclosure.
10. Calibration results without adjustment.

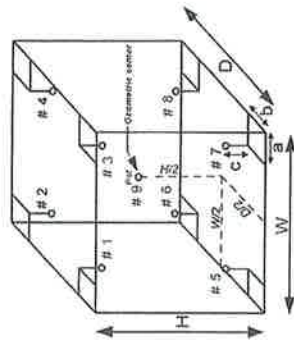


Figure:-Example of sensor  
Installation Positions

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

- End of Report -

**COPY**

**CONDUCTIVITY METER**

**Type : SevenCompact<sup>TM</sup> Conductivity meter S230**

**Serial No. : B744909989**

Certificate Number CCP-2407-23

Certificate Number CCP-2407-23

## Calibration Certificate SevenCompact™ Conductivity Meter S230

### Certification Tools

Certified conductivity resistors  
 Manufacturer METTLER-TOLEDO  
 Type 51302861  
 Serial number S260  
 Certificate number 62619  
 Date of certification February 15, 2022

### Customer

Company EASTERN THAI CONSULTING 1992 CO., LTD.  
 Address 683 Moo 11, Sukhaphiban 8 Rd., Nong Kham, Sriracha  
 Chonburi 20230  
 Customer ID number 301608441  
 Customer representative Sasiport Nakin

### Instrument

Type SevenCompact™ S230  
 Instrument serial number B744909889  
 Internal identification LABE 132  
 Firmware version 2.01.03

### Technical Specifications

Measuring range 0.001 µS/cm ... 1000 mS/cm  
 Resolution Auto range  
 Limit of error ±0.5%  
 Temperature range MTC -30.0 ... 130.0 °C  
 Temperature range ATC -5.0 ... 130.0 °C  
 Resolution 0.1 °C  
 Limit of error ±0.1 °C

### Procedure Statement

METTLER TOLEDO Certification SOP (Doc. No. 30027577) is used as referring documentation to adjust and certify the instrument indicated in the "Type" and "Serial number" section. The measurement results of this certification were obtained at ambient conditions.

**COPY**

**COPY**

Certificate Number CCP-2407-23

Certification Measurements

Designation	Certified value	Measured value	Max. tolerance	Passed / Failed
Conductivity sensor input (resistance)				
10 Ω	10.013 Ω	10.010 Ω	0.5 %	Passed
150 Ω	150.050 Ω	150.100 Ω	0.5 %	Passed
1.5 kΩ	1.500 kΩ	1500.00 Ω	0.5 %	Passed
15 kΩ	15.001 kΩ	15000 Ω	0.5 %	Passed
150 kΩ	149.920 kΩ	149900 Ω	0.5 %	Passed
1 MΩ	1.000 MΩ	1000000 Ω	0.5 %	Passed

Designation	Nominal value	Measured value	Max. tolerance	Passed / Failed
Conductivity sensor input (temperature)				
NTC 30 kΩ, 0 °C	0.0 °C	0.0 °C	0.1 °C	Passed
NTC 30 kΩ, 25 °C	25.0 °C	25.0 °C	0.1 °C	Passed
NTC 30 kΩ, 50 °C	50.0 °C	50.0 °C	0.1 °C	Passed
NTC 30 kΩ, 75 °C	75.0 °C	75.0 °C	0.1 °C	Passed
NTC 30 kΩ, 100 °C	100.0 °C	100.0 °C	0.1 °C	Passed

Resistor designation	Certified value	Measured value	Max. tolerance	Passed / Failed
Verification according to USP <645> cell constant = 0.100 /cm				
1 MΩ	0.100 μS/cm	0.100 μS/cm	0.1 μS/cm	Passed
150 kΩ	0.667 μS/cm	0.667 μS/cm	0.1 μS/cm	Passed
15 kΩ	6.666 μS/cm	6.667 μS/cm	0.1 μS/cm	Passed

Digital sensor input with conductivity sensor	The sensor was recognized correctly by the meter	Passed
-----------------------------------------------	--------------------------------------------------	--------

Summary of Certification

Certification of instrument

Passed

The instrument referred to in this certificate has fulfilled the criteria of the certification. This is indicated by the notation Passed above.

Remarks

Service Assignment ID : 0332630077

Certification of the instrument was performed by

Name	Thiraphong Salanoi	Function	Service Engineer
Company	Mettler-Toledo (Thailand) Ltd.		
Date	February 6, 2023	Signature	

COPY

Performance Test

Attachment to Certificate No. CCP-2407-23

Conductivity Sensor

Type: InLab 731-ISM S/N: 5821041078

Certified standards used

Standard 1: Type: Cond. Standard Manufacturer: METTLER TOLEDO Exp. date: 18-Mar-23  
Nominal value: ( 25.00 °C): 1413 μS/cm Lot No.: 1G077C

Standard 2: Type: Cond. Standard Manufacturer: METTLER TOLEDO Exp. date: 31-Mar-23  
Nominal value: ( 25.00 °C): 12.88 mS/cm Lot No.: 1G090B

Cell Constant Adjustment

Nominal	Old (cm <sup>-1</sup> )	New (cm <sup>-1</sup> )
1413 μS/cm	0.504069	0.550105

Measurements

(Reference Temperature: 25 °C and Temperature correction is 2.00 % / °C)

Before adjustment			After adjustment		
Buffer Values	Measured	Difference	Buffer Values	Measured	Difference
1413 μS/cm	26.5 °C	1316	1413 μS/cm	27.5 °C	1405
12.88 mS/cm	26.9 °C	12.14	12.88 mS/cm	27.4 °C	12.88

Note: The difference result of calibrated electrode should be within +/- 2.5%

Remarks:

Place:

Laboratory Room

Performance Date:

February 6, 2023

Service Specialist:

Thiraphong Salanoi

Signature:

COPY

**Hot Air Oven**

**Model. : UM 400**

**Serial No. : 900982**

## REPORT OF CALIBRATION

### Results of Calibration

Resolution : 0.1 °C

### 1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C) reading (°C)	Measured temperature at each positions (°C)										Uncertainty ± (°C)	Coverage factor k
		# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10		
85	85.0	85.0	85.04	84.62	84.82	85.03	85.04	85.00	84.96	85.08		0.25	2.00

### 2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
85	0.07	0.49	0.68

### Notes

- UUC\* = Unit Under Calibration

## CERTIFICATE OF CALIBRATION

**Customer** : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapibon 8 Rd., Nongkham,  
Siracha, Chonburi 20230

**Location of Calibration** : EASTERN THAI CONSULTING 1992 CO., LTD.  
(Hot Lab)

**Equipment** : Temperature controlled enclosures (Hot air oven)

**Manufacturer** : Memmert

**Model** : UM 400

**Serial No.** : 900982

**ID No.** : LABE 17/1

**Date of Receipt** : 21 February 2023

**Date of Calibration** : 21 February 2023

### Condition of Calibration

1. Environment	1.1 Ambient temperature	Maximum : 31.2 °C	Minimum : 28.7 °C
	1.2 Relative humidity	Maximum : 50.2 %	Minimum : 40.1 %
	1.3 Line voltage supplied	Maximum : 223.9 VAC	Minimum : 221.5 VAC

### 2. Calibration method

TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

### 3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Data acquisition with sensor (RTD-PT100)	LB-DA-12 (RTD-158 to RTD-166)	22-040312	02 May 2023

### 4. This certificate is traceable to the international system of unit (SI Unit).

The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

### 5. This result of calibration was found accurate as shown on date and place of calibration only.

### 6. Condition of calibration item : Normal

**Calibrated by** : Mr. Sarawoot Thammo

Scientist

**Approved by**

(Mr. Somchai Neampunt)  
Signed for Director

**Issue date** : 24 February 2023

The uncertainties are for a confidence probability of approximately 95%.  
The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

COPY



## REPORT OF CALIBRATION

Page 3 of 3

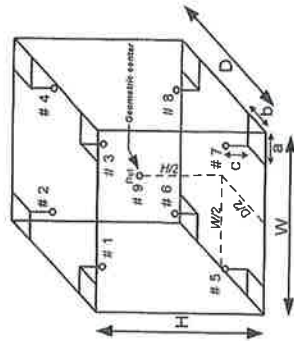
Certificate No. : 23-018635

Sample Code : 23-07651-001

## Results of Calibration

## Notes

1. Sensor installation locations
  - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
  - 1.2 The reference sensor is preferably located of the geometric center of the chamber.
2. Interior dimensions approx of chamber :  
W = 40 cm ; D = 28 cm ; H = 39 cm
3. Air valve or fresh air level : Off
4. Fan level : Open
5. The quoted uncertainty includes " Stability of chamber and loading effect in chamber at 20% of uniformity ".
6. 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.
7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.
8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.
9. UUC\* reading - the average reading of indicating device that forms the integral part of the enclosure.
10. Calibration results without adjustment.

Figure: Example of sensor  
installation Positions

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

- End of Report -

COPY

**INDUCTIBELY COUPLED PLASMA SPECTROMETER**

**Model : Prodigy 7**

**Serial No. : P70177**



Preventive Maintenance Report

Customer Name:	Eastern Thai Consulting 1992 Co., Ltd	Date: Dec 13, 2023
Instrument/Equipment:	ICP-OES	Model: Prodigy 7
Brand:	Teledyne Leeman Labs	S/N: P70177

Instrument Performance Certificate  
For ICP-OES

PRODUCT ID  
Serial Number  
Prodigy 7, Teledyne Leeman Labs  
P70177

Customer Name  
Address  
EASTERN THAI CONSULTING 1992 CO., LTD.  
999 Moo 11 Tambon Nong Kham, Amphoe Si Racha,  
Chonburi 20230

Date of Qualified  
Next Due date  
Dec 13, 2023  
May 13, 2024

This certifies for products which was performed in acceptable criteria specifications

Gas supply /Water chiller/Exhaust hood  
Cooling Systems  
Spectrometer  
RF Generator  
Sample Introduction & Autosampler  
Software & Computer  
Hardware Diagnostics Test  
Analytical Test

PASSED  
PASSED  
PASSED  
PASSED  
PASSED  
PASSED

Provided by  
Scientist Instrument Co., Ltd.  
113 Soi Ekachai 44, Ekachai Road  
Khlong Bang Phran, Bangkok  
Bangkok 10150 Thailand

Certified by  
Thunraphol Sakdayos  
Service Engineer

COPY

Engineer Sign

COPY

<b>3. RF Generator</b>	
Plasma Control	Status
Auto Start	OK <input checked="" type="checkbox"/>
Extinguish	OK <input checked="" type="checkbox"/>
RF power setting	OK <input checked="" type="checkbox"/>
Igniter	OK <input checked="" type="checkbox"/>
Air Knife	OK <input checked="" type="checkbox"/>
Coolant /Plasma Flow control	OK <input checked="" type="checkbox"/>
Aux Flow	OK <input checked="" type="checkbox"/>
Optimize sample introduction function	OK <input checked="" type="checkbox"/>
<b>4. Sample Introduction &amp; Autosampler</b>	
Plasma torch	Status
Plasma Torch	OK <input checked="" type="checkbox"/>
Spray chamber	OK <input checked="" type="checkbox"/>
Injector	OK <input checked="" type="checkbox"/>
Nebulizer pressure	OK <input checked="" type="checkbox"/>
Peristaltic pump and control	
Speed control	OK <input checked="" type="checkbox"/>
Sample tubing	OK <input checked="" type="checkbox"/>
Drain tubing	OK <input checked="" type="checkbox"/>
Autosampler Control	<input type="checkbox"/> Available <input checked="" type="checkbox"/> Not Available
Position movement	OK <input type="checkbox"/>
Drain tubing	OK <input type="checkbox"/>
Auto Rinse	OK <input type="checkbox"/>
<b>5. Computer &amp; Software Check:</b>	
Interface Cable USB	Status
Software Version 5.2	OK <input checked="" type="checkbox"/>
Operation function check :	OK <input checked="" type="checkbox"/>
Open /Save /Edit method	OK <input checked="" type="checkbox"/>
Instrument Control	OK <input checked="" type="checkbox"/>
Sequence	OK <input checked="" type="checkbox"/>
Full Frame Capture	OK <input checked="" type="checkbox"/>
Auto alignment /Hg alignment	OK <input checked="" type="checkbox"/>
Calibration Curve	OK <input checked="" type="checkbox"/>
Re-Calculation	OK <input checked="" type="checkbox"/>
Print Report	OK <input checked="" type="checkbox"/>

Engineer Sign

*SSWARD*

<b>6. Hardware Diagnostics Test</b>		
Power Supply	Value	Status
-12 VDC (+/- 5 %)	-12.7 V	Passed <input checked="" type="checkbox"/>
+12 VDC (+/- 5 %)	+11.91 V	Passed <input checked="" type="checkbox"/>
+3.3 VDC (+/- 5 %)	3.3 V	Passed <input checked="" type="checkbox"/>
+5.0 VDC (+/- 5 %)	4.945 V	Passed <input checked="" type="checkbox"/>
+13.5 VDC (+/- 5 %)	13.41 V	Passed <input checked="" type="checkbox"/>
Plasma Generator		
ICP Current 0.500A = 1kW	0.502 A	Passed <input checked="" type="checkbox"/>
ICP Ref 5.0Vdc = 1kW	5.002 V	Passed <input checked="" type="checkbox"/>
ICP Current 0.00 Vdc = 0kW	0 A	Passed <input checked="" type="checkbox"/>
ICP Ref 0.00Vdc = 0kW	0 V	Passed <input checked="" type="checkbox"/>
RF Water (Hz) OFF (1 Hz)	0 Hz	Passed <input checked="" type="checkbox"/>
RF Water (Hz) ON (25-35 Hz)	25 Hz	Passed <input checked="" type="checkbox"/>
Air Knife Pres. (0.00V ) OFF	0 V	Passed <input checked="" type="checkbox"/>
Air Knife Pres. (3.0 – 7.0 V) ON	3.56 V	Passed <input checked="" type="checkbox"/>
Neb setting to 25 psi	reading 25 psi	Passed <input checked="" type="checkbox"/>
Cool setting to 16 lpm	reading 16 lpm	Passed <input checked="" type="checkbox"/>
Aux setting to 0.5 lpm	reading 0.5 lpm	Passed <input checked="" type="checkbox"/>
Camera Water pump		
Pump Current (0.000 A) OFF	0 A	Passed <input checked="" type="checkbox"/>
Pump Voltage (0.000 V) OFF	0 V	Passed <input checked="" type="checkbox"/>
Pump Current (0.8 to 4.0A) ON	1.1 A	Passed <input checked="" type="checkbox"/>
Pump Voltage (8 to 13 V) ON	12.49 V	Passed <input checked="" type="checkbox"/>
Set Points		
Cam Tec Temperature (-30 to -38°C)	Set -32 °C Read -31 °C	Passed <input checked="" type="checkbox"/>
Op Purge Low (0-15.5 lpm)	Set 5 lpm Read 5.1 lpm	Passed <input checked="" type="checkbox"/>
Op Purge High (0-15.5 lpm)	Set 10 lpm Read 10.1 lpm	Passed <input checked="" type="checkbox"/>
Cam Wtr T (25-30°C)	Set 25 °C Read 25 °C	Passed <input checked="" type="checkbox"/>

<b>7. Cleaning &amp; Replacement</b>	
O-Ring Torch replacement	Status
Pump Tubing replacement	OK <input checked="" type="checkbox"/>
Glassware cleaning	OK <input checked="" type="checkbox"/>
Lubricate the roll peristaltic pump	OK <input checked="" type="checkbox"/>
Optical windows cleaning	OK <input checked="" type="checkbox"/>
Change & refilled Detector water chiller	OK <input checked="" type="checkbox"/>
Change & refilled RF Generator water Chiller	OK <input checked="" type="checkbox"/>
Clean All Electronics Board	OK <input checked="" type="checkbox"/>

Engineer Sign

*SSWARD*

8. Safety Interlock	
Status	
Argon pressure	OK ✓
Air Knife	OK ✓
RF power regulator	OK ✓
RF power temp	OK ✓
RF power current	OK ✓
RF water	OK ✓
Oscillator cover	OK ✓
Door switch	OK ✓
Camera purge	OK ✓
Camera TE cooler	OK ✓
Water chiller	OK ✓
Heater Fans	OK ✓

9. Analytical Test	
Method name	Mn Setup
SRM Standard	Mn
Calibration curve type	Linear
Rho	1
Element	Mn
QC standard Check	OK

Customer Sign	Engineer Sign
คุณอรรถพร	Signature 13/12/2023

**COPY**

**LIQUID IN GLASS THERMOMETER**

**Model : Total Immersion**

**Serial No. : 43560**



# QUALITY CALIBRATION CO.,LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkok, Bangkok 10160  
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584  
www.qcalibration.com



CERTIFICATE No : 23T10864  
REFERENCE No : 71117-1

PAGE : 1 OF 2

## Certificate of Calibration

EQUIPMENT : LIQUID IN GLASS THERMOMETER  
MANUFACTURER : PRECISION  
MODEL : 0 °C TO 100 °C

SERIAL No : 43560

ID No : LABE 16/1

RESOLUTION : 0.1 °C

TYPE : TOTAL IMMERSION

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 MOO 11, SUKHAPIBAN 8 ROAD, NONGKHAM,  
SRIRACHA, CHONBURI 20230

CALIBRATED BY : CHARUKIT L.

CALIBRATION DATE : 09-Nov-23

APPROVED BY : PONGSAK J.

ISSUED DATE : 09-Nov-23

RECEIVED DATE : 02-Nov-23

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF  
QUALITY CALIBRATION CO., LTD.

COPY



# QUALITY CALIBRATION CO.,LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkok, Bangkok 10160  
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584  
www.qcalibration.com

CERTIFICATE No : 23T10864

PAGE : 2 OF 2

## Calibration Report

EQUIPMENT : LIQUID IN GLASS THERMOMETER  
MANUFACTURER : PRECISION  
MODEL : 0 °C TO 100 °C  
ID No : LABE 16/1  
RESOLUTION : 0.1 °C  
RECEIVED DATE : 02-Nov-23  
AMBIENT TEMPERATURE : 23 °C ± 3 °C  
SERIAL NUMBER : 43560  
TYPE : TOTAL IMMERSION  
CALIBRATION DATE : 09-Nov-23  
RELATIVE HUMIDITY : 50 %RH ± 20 %RH

### CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BASED ON ASTM E77:1992 BY COMPARISON WITH STANDARD PLATINUM RESISTANCE THERMOMETER (SPRT) INTO LIQUID BATH TEMPERATURE CONTROLLER. THE TEMPERATURE SCALE USED WAS BASED ON ITS-90.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) STANDARD THERMOMETER	1502	77964	23T3927	08-Mar-24
2) SPRT PROBE	5614	636636	23T3927	08-Mar-24
3) PRECISION BATH	7320	A21105	22T13199	14-Dec-23
4) PRECISION BATH	CTR-40	A68155	22T13198	09-Dec-23
5) PRECISION BATH	6045	3C023	22T13200	19-Dec-23

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.  
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-

- NATIONAL INSTITUTE OF METROLOGY (THAILAND).

RESULT OF CALIBRATION : WITHOUT ADJUSTMENT

STANDARD READING (°C)	UUC* READING (°C)	IMMERSION DEPTH (mm)	CORRECTION (°C)	EMERGENT STEM TEMPERATURE (°C)	UNCERTAINTY OF MEASUREMENT (±°C)
0.009	0.0	60	0.0090	N/A	0.26
25.01	25.0	165	0.0050	N/A	0.26
50.00	50.0	275	0.0040	N/A	0.26
99.991	100.0	360	-0.009	29.3	0.26

UUC\* : UNIT UNDER CALIBRATION

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT

COPY

**pH Meter**

**Model. : SevenCompact S220**

**Serial No. : B448305208**

NSC-TISI-TSI 7025  
CALIBRATION 0152

## CERTIFICATE OF CALIBRATION

Page 1 of 3

Certificate No. : 23-011524

Sample Code : 23-04833-001

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapiban 8 Rd., Nongkham,  
Siracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited  
(Calibration Laboratory)

Equipment : pH Meter  
Manufacturer : METTLER TOLEDO Model : SevenCompact S220  
Serial No. : B448305208 ID No. : LABE 11/4  
Date of Receipt : 01 February 2023 Date of Calibration : 01 February 2023

## Condition of Calibration

1. Environment  
1.1 Ambient temperature : 25.0 ± 2.5 °C 1.2 Relative humidity : 55.0 % ± 15.0 %

## 2. Calibration method

In house method WI-CL-019: based on direct measurement by using standard voltage calibrator and using certified reference material (CRM).

## 3. Reference standard / Certified reference material

Instrument	ID No.	Certificate No.	Due Date
3.1 Voltage Calibrator	LB-AMC-01	22E3240	03 October 2023
3.2 Digital Thermometer	LB-TH-33	22-107027	02 October 2023
Certified Reference Material			
Lot No.	Ref No.	Expire Date	
3.3 Buffer Solution pH 4.008	838357	15 September 2024	
3.4 Buffer Solution pH 6.985	838358	15 September 2023	
3.5 Buffer Solution pH 10.008	838359	15 September 2023	

## 4. This certificate is traceable to the international system of unit (SI Unit).

- 4.1 Instrument No. 3.1 through Technology Promotion Association (Thailand-Japan).  
4.2 Instrument No. 3.2 through Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.  
4.3 Buffer Solution No. 3.3 and No. 3.5 traceable to CPA chem (through primary measurement method-Harned cell using calibrated thermometer, barometer, and nanovoltmeter. Accredited laboratory ISO/IEC 17025 and ISO/IEC 17034).  
4.4 Buffer Solution No. 3.4 traceable to CPA chem (BIM RefN HI-27 LoIN 04.06.2021 ; BIM RefN HI-28 LoIN 28.05.2021 ; BIM RefN HI-27 LoIN 04.06.2021 ; BIM RefN HI-28 LoIN 28.05.2021 Accredited laboratory ISO/IEC 17025 and ISO/IEC 17034).

## 5. This result of calibration was found accurate as shown on date and place of calibration only.

## 6. Condition of calibration item : Normal

Calibrated by : Mr. Anupong Lakawin

Scientist

(Ms. Pawana Pan-on)

Signed for Director

Issue date : 03 February 2023

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only  
This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC)

NSC-TISI-TSI 7025  
CALIBRATION 0152

## REPORT OF CALIBRATION

Page 2 of 3

Certificate No. : 23-011524

Sample Code : 23-04833-001

Equipment : pH Meter Resolution : 0.01 pH ; 0.1 mV ; 0.1°C  
Manufacturer : METTLER TOLEDO Model : SevenCompact S220  
Serial No. : B448305208 ID No. : LABE 11/4  
Range : -2.000 pH to 20.000 pH ; ± 2000.0 mV ; -5.0°C to 130.0°C

## Results of Calibration

## Part 1. DC Voltage measurement

pH Meter Serial No. : B448305208

Nominal Value	Applied DC Voltage	Average indicator reading		Uncertainty	Coverage factor
		mV	pH		
0	414.113	414.0	0.00	± 0.083	2.00
4	177.477	177.5	4.00	± 0.083	2.00
7	0.000	0.1	7.00	± 0.083	2.00
10	-177.477	-178.3	10.00	± 0.083	2.00
14	-414.113	-413.8	14.00	± 0.083	2.00

## Part 2. Performance of Electrode system

Electrode Manufacturer : METTLER TOLEDO

Model

Electrode Serial No. : 2365921

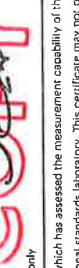
InLab Expert Pro-ISM

Three-Point Calibration at pH4 and pH7 Percent Slope : 99.6 ; at pH7 and pH10 Percent Slope : 98.4

Standard Buffer Solution	Average indicator reading		Error Value	Uncertainty	Coverage factor
	pH (@ 25 °C)	mV			
4.008	4.01	184.2	0.002	± 0.011	2.00
6.985	6.99	8.9	0.005	± 0.010	2.00
10.008	10.01	-166.8	0.002	± 0.010	2.00

The result expanded uncertainty (U) is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

D.D.





## REPORT OF CALIBRATION

Page 3 of 3

Certificate No. : 23-011524

Sample Code : 23-04833-001

Equipment : pH Meter (Digital Thermometer with sensor)

Thermometer readout

Manufacturer : METTLER TOLEDO Model : SevenCompact S220

Serial No. : B448305208 ID No. : LABE 11/4

Resolution : 0.1 °C Range : -5.0 °C to 130.0 °C

Thermometer sensor

Manufacturer : METTLER TOLEDO Model : InLab Expert Pro-ISM

Serial No. : 2365921 ID No. : N/A

## Condition of Calibration

1. Environment
  - 1.1 Ambient temperature : 23.0 °C ± 3.0 °C
  - 1.2 Relative humidity : 55.0 % ± 15.0 %

## 2. Calibration method

- 2.1 The calibration use in house method WI-CL-021 : by comparison with standard thermometer
- 2.2 The calibration by comparison unit under calibration (UUC) to the standard thermometer in a calibration bath at the controlled temperature.

2.3 The temperature scale in use of this laboratory is the international temperature scale of 1990 (ITS-90).

## 3. Reference standard instrument

Instrument	Model	ID No.	Certificate No.	Due date
3.1 Platinum Resistance Thermometer	PT-100	RTD-90	22-107027	02 October 2023
3.2 Thermometer Readout	GT-11	LB-TM-33	22-107027	02 October 2023

4. This certificate is traceable to the international system of unit (SI Unit).  
Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (Accreditation Under TLAS Laboratory Calibration No.0152)

5. This result of calibration was found accurate as shown on date and place of calibration only.
6. Condition of Calibration item : Normal

## Results of Calibration

Calibration point °C	Average of standard reading °C	Unit under calibration		Expanded uncertainty °C	Coverage factor k
		Immersion depth mm	Average reading °C		
25	25.002	120	25.0	± 0.13	2.00

## Notes

- Calibration results without adjustment

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with JGAS M3003

DD

- End of report -

COPY

**STANDARD WEIGHT 50 g**



Certificate No. : 22-052238  
Sample Code : 22-19150-003

Page 1 of 3

## CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapiban 8 Rd., Nongkham,  
Sriracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited  
(Calibration Laboratory)

Equipment : Standard Weight 50 g

Manufacturer : METTLER TOLEDO

Class : F1

Serial No. : N/A

ID No. : LABE 10/1

Date of Receipt : 18 May 2022

Date of Calibration : 30 May 2022

Calibrated by : Mr. Somwang Sangdee  
Scientist  
Approved by : ( Mr. Somchai Neampunt )  
Signed for Director

Issue date : 31 May 2022

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

361 Soi Ladprao 122, Ladprao Road,  
Phlabphla, Wang Thonglang, Bangkok 10310  
FM-CL-007  
TEL 02-516-2422  
FAX 02-516-6949  
Rev.05  
CONTACT@AMARC.CO.TH  
WWW.AMARC.CO.TH  
Effective Date: 15/10/21



Certificate No. : 22-052238  
Sample Code : 22-19150-003

Page 2 of 3

## REPORT OF CALIBRATION

Equipment : Standard Weight 50 g

Manufacturer : METTLER TOLEDO

Class : F1

Serial No. : N/A

ID No. : LABE 10/1

### Result of Calibration :

☒ Without adjustment

☐ Adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature ( $t_{ref}$ ) of 20°C, the conventional mass is the mass of a reference weight of a density ( $\rho_{ref}$ ) of 8000 kg.m<sup>-3</sup> which it balances in air of a reference density ( $\rho_0$ ) of 1.2 kg.m<sup>-3</sup>

Description	Deviation	Conventional	Expanded	Maximum	ID No.
	(mg)	Mass	Uncertainty	Permissible Error	
			(mg)	$\pm$ (mg)	
50 g	-0.324	49.999676 g	0.10	0.30	LABE 10/1

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty multiplied by the coverage factor  $k=2.0$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

**COPY**

361 Soi Ladprao 122, Ladprao Road,  
Phlabphla, Wang Thonglang, Bangkok 10310  
FM-CL-084  
TEL 02-516-2422  
FAX 02-516-6949  
Rev.03  
CONTACT@AMARC.CO.TH  
WWW.AMARC.CO.TH  
Effective Date: 15/10/21



Certificate No. : 22-052238

Sample Code : 22-19150-003

Page 3 of 3

## REPORT OF CALIBRATION

## Condition of Calibration

1. Ambient Conditions : Temperature  $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$ , Relative humidity  $50\% \pm 10\%$  and air density  $1.20 \text{ kg/m}^3$
2. Calibration Method : Direct comparison weighing according to OIML R111-1 : 2004(E)
3. Reference standard instrument

Instrument	Class	ID No.	Certificate No.	Due Date
1) Standard Weight 1 mg to 1 kg	E2	LB-WE-79	21-078366	22 September 2022

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

Asia Medical and Agricultural Laboratory and Research Center Public Company Limited

(Instrument number 1).

5. Condition of Calibration item: Normal

## 6. Description of Calibrated Item :

Type and Nominal Value :	Standard Weight 50 g
Shape :	Cylindrical weight with knob
Material :	Stainless steel
Case :	Wooden Box
Comments :	Recalibration

- End of Report -

COPY

**STANDARD WEIGHT 100 g**



Certificate No. : 22-052239  
Sample Code : 22-19150-004

Page 1 of 3

## CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapiban 8 Rd., Nongkham,  
Siriracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited  
(Calibration Laboratory)

Equipment : Standard Weight 100 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/2

Date of Receipt : 18 May 2022

Date of Calibration : 30 May 2022

Calibrated by : Mr. Somwang Sangdee  
Scientist

Issue date : 31 May 2022

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

361 Soi Ladprao 122, Ladprao Road,  
Phlabphla, Wang Thonglang, Bangkok 10310  
FM-CL-017

TEL 02-516-2422  
FAX 02-516-6949  
Rev.05

CONTACT@AMARC.CO.TH  
WWW.AMARC.CO.TH  
Effective Date: 15/10/21



Certificate No. : 22-052239  
Sample Code : 22-19150-004

Page 2 of 3

## REPORT OF CALIBRATION

Equipment : Standard Weight 100 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/2

Result of Calibration : ☒ Without adjustment ☐ Adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature ( $t_{ref}$ ) of 20°C, the conventional mass is the mass of a reference weight of a density ( $\rho_{ref}$ ) of 8000 kg.m<sup>-3</sup> which it balances in air of a reference density ( $\rho_a$ ) of 1.2 kg.m<sup>-3</sup>

Description	Deviation	Conventional	Expanded	Maximum	ID No.
		Mass	Uncertainty	Permissible Error	
	(mg)		(mg)	± (mg)	
100 g	-0.171	99.999829 g	0.16	0.50	LABE 10/2

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty multiplied by the coverage factor  $k = 2.0$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

**COPY**

361 Soi Ladprao 122, Ladprao Road,  
Phlabphla, Wang Thonglang, Bangkok 10310  
FM-CL-064

TEL 02-516-2422  
FAX 02-516-6949  
Rev.03

CONTACT@AMARC.CO.TH  
WWW.AMARC.CO.TH  
Effective Date: 15/10/21



Certificate No. : 22-052239

Sample Code : 22-19150-004

## REPORT OF CALIBRATION

## Condition of Calibration

1. Ambient Conditions : Temperature 20 °C ± 1.5°C, Relative humidity 50% ± 10% and air density 1.18 kg/m<sup>3</sup>

2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)

3. Reference standard instrument

Instrument	Class	ID No.	Certificate No.	Due Date
1) Standard Weight 1 mg to 1 kg	E2	LB-WE-78	21-079366	22 September 2022

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

Asia Medical and Agricultural Laboratory and Research Center Public Company Limited

(Instrument number 1).

5. Condition of Calibration item: Normal

## 6. Description of Calibrated item :

Type and Nominal Value :	Standard Weight 100 g
Shape :	Cylindrical weight with knob
Material :	Stainless steel
Case :	Wooden Box
Comments :	Recalibration

- End of Report -

COPY

**STANDARD WEIGHT 50 g**

MSC-TS-17517025  
CALIBRATION 0152

Page 1 of 3

Certificate No. : 22-052237

Sample Code : 22-19150-002

## CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.

689 Moo 11, Sukhapiban 8 Rd., Nongkham,

Siracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited  
(Calibration Laboratory)

Equipment : Standard Weight 50 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/4

Date of Receipt : 18 May 2022

Date of Calibration : 30 May 2022

Calibrated by : Mr. Somwang Sangdee  
Scientist

Issue date : 31 May 2022

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

MSC-TS-17517025  
CALIBRATION 0152

Page 2 of 3

Certificate No. : 22-052237

Sample Code : 22-19150-002

## REPORT OF CALIBRATION

Equipment : Standard Weight 50 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/4

## Result of Calibration :

☒ Without adjustment☐ Adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature ( $t_{ref}$ ) of 20°C, the conventional mass is the mass of a reference weight of a density ( $\rho_{ref}$ ) of 8000 kg.m<sup>-3</sup> which it balances in air of a reference density ( $\rho_0$ ) of 1.2 kg.m<sup>-3</sup>

Description	Deviation	Conventional		Expanded	Maximum		ID No.
		Mass			Uncertainty	Permissible Error	
	(mg)			(mg)	± (mg)		
50 g	-0.111	49.999889	g	0.10	0.30		LABE 10/4

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2.0$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

COPY



Certificate No. : 22-052237

Sample Code : 22-19150-002

Page 3 of 3

## REPORT OF CALIBRATION

## Condition of Calibration

1. Ambient Conditions : Temperature 20 °C ± 1.5°C, Relative humidity 50% ± 10% and air density 1.18 kg/m<sup>3</sup>
2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)

## 3. Reference standard instrument

Instrument	Class	ID No.	Certificate No.	Due Date
1) Standard Weight 1 mg to 1 kg	E2	LB-WE-79	21-079366	22 September 2022

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

Asia Medical and Agricultural Laboratory and Research Center Public Company Limited

(Instrument number 1).

5. Condition of Calibration item: Normal

## 6. Description of Calibrated Item :

Type and Nominal Value :	Standard Weight 50 g
Shape :	Cylindrical weight with knob
Material :	Stainless steel
Case :	Wooden Box
Comments :	Recalibration

- End of Report -

COPY

**THERMO-HYGROMETER**

**Model : 608-H1**

**Serial No. : 45106737**



## CERTIFICATE OF CALIBRATION

Page 1 of 2  
Certificate No. : 23-055203  
Sample Code : 23-21440-001

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapiarn 8 Rd., Nongkham,  
Siiracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited  
(Calibration laboratory)

Equipment : Digital thermo-hygrometer  
Manufacturer : testo  
Serial No. : 45106737  
Date of Receipt : 25 May 2023

Model : 60B-H1  
ID No. : LABE 09/7  
Date of Calibration : 29 May 2023

## Condition of Calibration

1. Environment
  - 1.1 Ambient temperature : 23.0 °C ± 3.0 °C
  - 1.2 Relative humidity : 55.0 % ± 15.0 %

## 2. Calibration method

- 2.1 In-house method: WI-CL-045 By comparison with thermometer standard / chilled mirror hygrometer in controlled chamber.
- 2.2 The calibration by comparison unit under calibration (UUC) to the thermometer standard / chilled mirror hygrometer in a chamber at the controlled temperature / relative humidity.

## 3. Reference standard instrument

Instrument	Model	ID No.	Certificate No.	Due Date
3.1 Chilled Mirror	Optidew Vision	LB-OP-02 & LB-OP-02 (DP)	TH-0157-22	05 December 2023
3.2 Digital Thermometer	Optidew Vision	LB-OP-02 & LB-OP-02 (Temp.)	23-014916	12 February 2024
3.3 Digital Thermometer	34972A	LB-DA-07 with RTD-89	22-095535	06 September 2023

## 4. This certificate is traceable to the international system of unit (SI Unit).

- 4.1 Instrument No. 3.1 through National Institute of Metrology (Thailand).
- 4.2 Instrument No. 3.2 and 3.3 through Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

## 5. This result of calibration was found accurate as shown on date and place of calibration only.

## 6. Condition of calibration item : Normal

Calibrated by : Miss Pornsuda Lohabai

Scientist

Issue date : 31 May 2023

(Mr. Somchai Neampunt)

Signed for Director

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).



## REPORT OF CALIBRATION

## Results of Calibration

## Temperature measurement

Resolution : 0.1 °C  
Range : 0 °C to 50 °C

Calibration point °C	Average of standard reading		Unit under calibration		Expanded uncertainty °C
	Controlled humidity %RH	Temperature °C	Average reading °C	Correction value °C	
20	50	20.00	20.0	0.00	± 0.39
25	50	25.02	25.1	0.08	± 0.39
30	50	30.00	30.0	0.00	± 0.39

## Humidity measurement

Resolution : 0.1 %RH  
Range : 10 %RH to 95 %RH

Calibration point %RH	Average of standard reading		Unit under calibration		Expanded uncertainty %RH
	Air temperature °C	Calculated humidity %RH	Average reading %RH	Correction value %RH	
45	25.00	45.18	53.5	8.32	± 1.3
60	25.00	60.03	68.3	8.27	± 1.5
75	25.00	75.20	83.2	8.00	± 1.7

## Notes

- Calibration results without adjustment.

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty multiplied by the coverage factor  $k$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

- End of Report -

COPY

## Agilent CrossLab Start Up Services

### Agilent 7890 Gas Chromatograph

### Preventive Maintenance Checklist

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure consistent operation and the accuracy of your results.

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak. This checklist will be completed at the end of the service and provided to you as a record of the preventive maintenance activities.

#### Agilent 7890 GC Preventive Maintenance Checklist

## Introduction

### Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- Any parts, not included in the Parts Lists section of this document, are not part of the recommended Preventive Maintenance service, nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.

### Important Customer Web Links

- For more information about **Agilent Technologies services**, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair>
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>.
- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A useful **Agilent Resource Center** web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>.
- Need technical support, FAQs, supplies? – Visit our **Support Home page** <http://www.agilent.com/search/support>.
- **Videos** about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>.
- **7890B Manuals** are also available on Agilent.com:
  - **Safety** [https://www.agilent.com/cs/library/usermanuals/public/7890B\\_Safety.pdf](https://www.agilent.com/cs/library/usermanuals/public/7890B_Safety.pdf)
  - **Installation and First Startup** [https://www.agilent.com/cs/library/usermanuals/Public/7890B\\_Installation.pdf](https://www.agilent.com/cs/library/usermanuals/Public/7890B_Installation.pdf)
  - **Operation Manual** [https://www.agilent.com/cs/library/usermanuals/Public/7890B\\_Operation.pdf](https://www.agilent.com/cs/library/usermanuals/Public/7890B_Operation.pdf)
  - **Maintaining Your GC** [https://www.agilent.com/cs/library/usermanuals/public/G3430-90052%207890B\\_Maintaining%20Guide.pdf](https://www.agilent.com/cs/library/usermanuals/public/G3430-90052%207890B_Maintaining%20Guide.pdf)

## Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Section not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance service in the order of the tasks listed.
- Complete the Service Review section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Complete the total number of pages field in the Service Completion section
- Ask the customer to sign the Service Completion section including the customer's and your signature.

## Additional Instruction Notes

- Check for any active service notes for this unit. If there are any applicable "Safety" or "Modification Recommended" Service notes, plan to implement the changes on this unit before doing any qualification service.
- Do not implement firmware updates, unless you get approval from the customer and are sure that they are compatible with the instrument control software.

## System Information

- ☒ Check this box if an instrument configuration report is attached instead of completing the table below.

Instrument System Name and ID	GC7890B	CN15343147
Instrument System Site and Location	Secret Co, Ltd.	Engineering room.

List System Component	Product Numbers	List the Serial Numbers of each Component
1.	G3440B	CN15343147
2.	G4513A	CN1910080
3.	G4514A	CN19080006
4.		
5.		
6.		
7.		
8.		
9.		
10.		

## Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components, settings as defined by current Service Notes.
- ☒ Check for required firmware updates and verify with customers if they would like them installed.
- ☒ Before starting the following procedures, record the Detector Signal Output(s) in the results table. If the GC is turned OFF or in a service mode, comparing the detector outputs before and after the service is not possible.

## Preventive Maintenance Procedure

### Clean and inspect GC

- ☒ Unplug power cord from the power source.
- ☒ Open GC covers and vacuum/remove any dust/debris. Pay particular attention to cooling fans.
- ☒ Inspect internal connectors for proper contact and placement.
- ☒ Reconnect Power to the GC. Power the GC on and verify the power on self test passed.
- ☒ Verify oven motor spins freely and turns on with the oven door closed; off when the door is opened.
- ☒ Verify operation of all other fans - the inlet and EPC cooling fans.
- ☒ Verify oven intake/outlet flap assembly is operating smoothly while heating and cooling the oven

### Inlet and detector consumable replacement

- ☒ For the inlets installed, perform inlet maintenance as defined in the 7890 manual – "Maintaining Your GC" - for the inlet(s) installed.
- ☒ Replace the split vent trap cartridge filter on units with these inlets: Split/Splitless Capillary (SSL), Multi-Mode Inlet (MMI), Programmed Temperature Vaporizer (PTV), Volatiles Interface (VI).
- ☒ If the inlet system is used in Split Mode with viscous samples, inspect and clean the split vent tube on the inlet and flush or replace the tubing between the inlet and the split vent trap.
- ☒ If the GC includes a Flame Ionization Detector (FID), replace the jet. If the ignitor shows any buildup of sample or corrosion, replace the ignitor. Examine the FID collector and castle assemblies for contamination – clean as necessary.

### Zero Sensors and Leak test

- ☒ Zero all pressure sensors per the procedure in the 7890 "Advanced User Guide".
- ☒ Perform inlet pressure decay test(s) as defined in the 7890 "Troubleshooting Manual". If the PM is done in preparation for an Operational Qualification, then the pressure decay test defined within that protocol can be used for the PM.
- ☒ Record if test passed or failed in the results table.

## ALS Maintenance

- ☐ **Section NOT applicable**
- ☒ Check all cabling and configuration settings between GC, tray, and injectors.
- ☒ Vacuum or remove any dust, especially around fans.
- ☒ Check operation of all fans.
- ☒ Check syringe for smooth plunger operation.
- ☒ Check for smooth operation of the needle support – clean if necessary

### Restore Instrument

- ☒ Restore the normal operating conditions or customer method using the Data System.
- ☒ Purge the system with carrier flow for 15 minutes
- ☒ Bake out the system, then restore the normal operating conditions
- ☒ After equilibration, check and record the post PM detector signal output values.
- ☒ Results should be similar or lower than the detector outputs recorded prior to PM.
- ☐ Perform a chemical checkout. If this is a routine PM, inject the customer's sample using the ALS if applicable. This will act as a final checkout of both the ALS and the GC.

Note: If the PM Service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

## Signature Page Service Review

- ☐ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review with the customer this service, parts replaced, and test results obtained.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box or if necessary, in the customer's IQ records.
- ☐ Supply the customer with a copy of the Smart Alerts flyer.
- ☐ Describe Smart Alerts to the customer.
- ☐ Install Smart Alerts if requested.

## 7890 GC Test Results Table

Detector Signal Outputs	Before PM Service	After PM Service
Front detector output <i>100</i>	<i>N/A</i>	<i>126.2</i>
Back detector output <i>FID</i>	<i>N/A</i>	<i>52.6</i>
AUX detector output	<i>N/A</i>	<i>N/A</i>
Pressure decay test	Expected test result	Actual test result
Front inlet pressure decay test	Pass	<i>Pass</i>
Back inlet pressure decay test	Pass	<i>Pass</i>

## 7890 Parts List Table

The following kits are recommended for capillary and purged packed inlets. If this is a general PM and the customer has a preferred set of consumables, you may use the customer's consumables.

Part description	Part number	Product or model# where used	Quantity consumed
SSL Capillary Inlet PM kit, Splitless	5188-6497	7890A/B	<i>N/A</i>
SSL Capillary Inlet PM kit, split	5188-6496	7890A/B	<i>2</i>
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	<i>N/A</i>
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	<i>N/A</i>
SSL Capillary Ultra Inert Inlet Low Pressure Drop Split Liner - with Glass Wool	5190-2295	7890A/B	<i>N/A</i>
PP Inlet PM kit	5188-6498	7890A/B	<i>N/A</i>
Split vent trap PM kit, single cartridge (for MMI, PTV & VI)	5188-6495	7890A/B	<i>N/A</i>
MMI Cleaning Kit	G3510-60820	7890A/B	<i>N/A</i>
PTV Septumless Head Rebuild Kit	5182-9747	7890A/B	<i>N/A</i>
PTV Septumless Head Teflon Guide	5182-9748	7890A/B	<i>N/A</i>
Ignitor (glow plug) assembly with O-ring	19231-60680	7890A/B	<i>N/A</i>
FID Collector Rebuild/Cleaning Kit	G1531-67000	7890A/B	<i>N/A</i>
Standard .011-inch FID Jet for capillary FID base	G1531-80560	7890A/B	<i>1</i>
High Temperature .018-inch FID Jet for capillary FID base	G1531-80620	7890A/B	<i>N/A</i>
Standard .018-inch FID Jet for packed column with packed FID base	18710-20119	7890A/B	<i>N/A</i>
Standard .011-inch FID Jet for capillary column with packed/adaptable FID base	19244-80560	7890A/B	<i>N/A</i>
High Temperature .018-inch FID Jet for capillary column with packed/adaptable FID base	19244-80620	7890A/B	<i>N/A</i>
NPD Jet, universal fit, .011-inch ID	G1534-80580	7890A/B	<i>N/A</i>
NPD Jet, universal fit, .011-inch ID Extended tip	G1534-80590	7890A/B	<i>N/A</i>
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	<i>N/A</i>
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	<i>N/A</i>
**FID Collector Replacement Kit, if needed	G1531-67001	7890A/B	<i>N/A</i>

## Service Engineer Comments

If there are any specific points you wish to note as part of performing the service or other items of interest for the customer, please write include them in this box.

## Service Completion

Service request number 606041153 Date service completed 29 May 2023  
 Agilent signature [Signature] Customer signature [Signature]  
 Total number of pages in this document 9 pages



## Certificate of Completion

Learner Name:	Saengthai Saeng Tanak
Title Of Course:	AN-ASP/CE/CSE-1-001-M: 7890/7820 GC and OL GC Standalone Chemstation I&E/Service
Completion Date:	November 23, 2014
Certified By Company:	Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service technician. It is not valid for use as proof of training for anyone other than the individual named on the certificate. It does not guarantee ongoing training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

## Document Name:

Operator's training certificate and qualifications



## Certificate of Completion

Learner Name:

Saeugthai Tanak

Title Of Course:

ANCE-GCMS-2-041-D: 5977 EL/CHES MSD GC-MS OPER, H/W S/W - Intro, Repair and Troubleshooting

Completion Date:

March 18, 2016

Certified By Company:

Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.



## Certificate of Completion

Learner Name:

Saeugthai Saeug Tanak

Title Of Course:

AN-CE-GC-II-022-A: Advanced GC Detectors Application and Troubleshooting Labs

Completion Date:

November 25, 2014

Certified By Company:

Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's Safety Alerts, Service Notes, internal technical updates, update training, current documentation, technical support, current parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

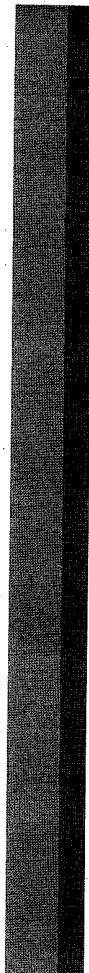
Date:  
System ID:September 6, 2018 6:11:18 PM  
SGH545TXVW

Page 37 / 38

## Agilent CrossLab Start Up Services

### Agilent 7890 Gas Chromatograph

### Preventive Maintenance Checklist



Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results.

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak. This checklist will be completed at the end of the service and provided to you as a record of the preventive maintenance activities.

## Introduction

### Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- Any parts, not included in the Parts Lists section of this document, are not part of the recommended Preventive Maintenance service, nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.

### Important Customer Web Links

- For more information about **Agilent Technologies services**, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair>
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>.
- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A useful **Agilent Resource Center** web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>.
- Need technical support, FAQs, supplies? – visit our **Support Home page** <http://www.agilent.com/search/support>.
- **Videos** about specific preparation requirements for your instrument can be found by searching the *Agilent YouTube* channel at <https://www.youtube.com/user/agilent>.
- **7890B Manuals** are also available on Agilent.com:
  - **Safety** [https://www.agilent.com/cs/library/usermanuals/public/7890B\\_Safety.pdf](https://www.agilent.com/cs/library/usermanuals/public/7890B_Safety.pdf)
  - **Installation and First Startup** [https://www.agilent.com/cs/library/usermanuals/Public/7890B\\_Installation.pdf](https://www.agilent.com/cs/library/usermanuals/Public/7890B_Installation.pdf)
  - **Operation Manual** [https://www.agilent.com/cs/library/usermanuals/Public/7890B\\_Operation.pdf](https://www.agilent.com/cs/library/usermanuals/Public/7890B_Operation.pdf)
  - **Maintaining Your GC** [https://www.agilent.com/cs/library/usermanuals/public/G3430-90052%207890B\\_Maintaining%20Guide.pdf](https://www.agilent.com/cs/library/usermanuals/public/G3430-90052%207890B_Maintaining%20Guide.pdf)

## Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Section not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance service in the order of the tasks listed.
- Complete the Service Review section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Complete the total number of pages field in the Service Completion section
- Ask the customer to sign the *Service Completion section including the customer's and your signature.*

## Additional Instruction Notes

- Check for any active service notes for this unit. If there are any applicable "Safety" or "Modification Recommended" Service notes, plan to implement the changes on this unit before doing any qualification service.
- Do not implement firmware updates, unless you get approval from the customer and are sure that they are compatible with the instrument control software.

## System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table below.

Instrument System Name and ID	CN13201053
Instrument System Site and Location	SECOT, Bangkok

List System Component Product Numbers		List the Serial Numbers of each Component
1.	G13440A	CN13201053
2.	G4513A	CN13260196
3.	G4514A	CN13230091
4.		
5.		
6.		
7.		
8.		
9.		
10.		

## Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components, settings as defined by current Service Notes.
- ☒ Check for required firmware updates and verify with customers if they would like them installed.
- ☒ Before starting the following procedures, record the Detector Signal Output(s) in the results table. If the GC is turned OFF or in a service mode, comparing the detector outputs before and after the service is not possible.

## Preventive Maintenance Procedure

### Clean and inspect GC

- ☒ Unplug power cord from the power source.
- ☒ Open GC covers and vacuum/remove any dust/debris. Pay particular attention to cooling fans.
- ☒ Inspect internal connectors for proper contact and placement.
- ☒ Reconnect Power to the GC. Power the GC on and verify the power on self-test passed.
- ☒ Verify oven motor spins freely and turns on with the oven door closed; off when the door is opened.
- ☒ Verify operation of all other fans - the inlet and EPC cooling fans.
- ☒ Verify oven intake/outlet flap assembly is operating smoothly while heating and cooling the oven

### Inlet and detector consumable replacement

- ☒ For the inlets installed, perform inlet maintenance as defined in the 7890 manual - "Maintaining Your GC" - for the inlet(s) installed.
- ☒ Replace the split vent trap cartridge filter on units with these inlets: Split/Splitless Capillary (SSL), Multi-Mode Inlet (MMI), Programmed Temperature Vaporizer (PTV), Volatiles Interface (VI).
- ☒ If the inlet system is used in Split Mode with viscous samples, inspect and clean the split vent tube on the inlet and flush or replace the tubing between the inlet and the split vent trap.
- ☒ If the GC includes a Flame Ionization Detector (FID), replace the jet. If the ignitor shows any buildup of sample or corrosion, replace the ignitor. Examine the FID collector and castle assemblies for contamination - clean as necessary.

### Zero Sensors and Leak test

- ☒ Zero all pressure sensors per the procedure in the 7890 "Advanced User Guide".
- ☒ Perform inlet pressure decay test(s) as defined in the 7890 "Troubleshooting Manual". If the PM is done in preparation for an Operational Qualification, then the pressure decay test defined within that protocol can be used for the PM.
- ☒ Record if test passed or failed in the results table.

## ALS Maintenance

- ☐ **Section NOT applicable**
- ☒ Check all cabling and configuration settings between GC, tray, and injectors.
- ☒ Vacuum or remove any dust, especially around fans.
- ☒ Check operation of all fans.
- ☒ Check syringe for smooth plunger operation.
- ☒ Check for smooth operation of the needle support - clean if necessary

## Restore Instrument

- ☒ Restore the normal operating conditions or customer method using the Browser interface or Data System.
- ☒ Purge the system with carrier flow for 15 minutes
- ☒ Bake out the system, then restore the normal operating conditions
- ☒ After equilibration, check and record the post PM detector signal output values. Results should be similar or lower than the detector outputs recorded prior to PM.
- ☐ Perform a chemical checkout. If this is a routine PM, inject the customer's sample using the ALS if applicable. This will act as a final checkout of both the ALS and the GC.

Note: If the PM Service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

## Signature Page

### Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review with the customer this service, parts replaced, and test results obtained.
- ☐ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box or if necessary, in the customer's IQ records.
- ☐ Supply the customer with a copy of the Smart Alerts flyer.
- ☐ Describe Smart Alerts to the customer.
- ☐ Install Smart Alerts if requested.

### 7890 GC Test Results Table

Detector Signal Outputs	Before PM Service	After PM Service
Front detector output	N/A	N/A
Back detector output		
AUX detector output		
<b>Pressure decay test</b>	<b>Expected test result</b>	<b>Actual test result</b>
Front inlet pressure decay test	Pass	Pass
Back inlet pressure decay test	Pass	N/A

## 7890 Parts List Table

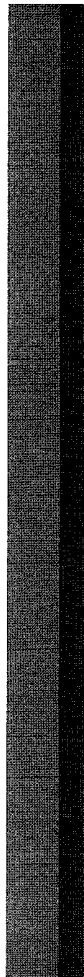
The following kits are recommended for capillary and purged packed inlets. If this is a general PM and the customer has a preferred set of consumables, you may use the customer's consumables.

Part description	Part number	Product or model# where used	Quantity consumed
SSL Capillary Inlet PM kit, Splitless	5188-6497	7890A/B	N/A
SSL Capillary Inlet PM kit, split	5188-6496	7890A/B	1
SSL Capillary Ultra Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	1
SSL Capillary Ultra Inlet Low Pressure Drop Split Liner - with Glass Wool	5190-2295	7890A/B	
PP Inlet PM kit	5188-6498	7890A/B	
Split vent trap PM kit, single cartridge (for MMI, PTV & VI)	5188-6495	7890A/B	
MMI Cleaning Kit	G3510-60820	7890A/B	
PTV Septumless Head Rebuild Kit	5182-9747	7890A/B	
PTV Septumless Head Teflon Guide	5182-9748	7890A/B	
Ignitor (glow plug) assembly with O-ring	19231-60680	7890A/B	
FID Collector Rebuild/Cleaning Kit	G1531-67000	7890A/B	
Standard .011-inch FID Jet for capillary FID base	G1531-80560	7890A/B	
High Temperature .018-inch FID Jet for capillary FID base	G1531-80620	7890A/B	
Standard .018-inch FID Jet for packed column with packed FID base	18710-20119	7890A/B	
Standard .011-inch FID Jet for capillary column with packed/adaptable FID base	19244-80560	7890A/B	
High Temperature .018-inch FID Jet for capillary column with packed/adaptable FID base	19244-80620	7890A/B	
NPD Jet, universal fit, .011-inch ID	G1534-80580	7890A/B	
NPD Jet, universal fit, .011-inch ID Extended tip	G1534-80590	7890A/B	
SSL Capillary Ultra Inlet Gold Seal with Washer	5190-6144	7890A/B	
SSL Capillary Ultra Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	
**FID Collector Replacement Kit, if needed	G1531-67001	7890A/B	

Agilent 7890 GC Preventive Maintenance Checklist

## Service Engineer Comments

If there are any specific points you wish to note as part of performing the service or other items of interest for the customer, please write include them in this box.



Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results. Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides what you need to reduce unplanned downtime and keep your systems operating at their peak performance.

This checklist is used as a guide for completing the preventive maintenance tasks. A signed copy of this checklist is provided for your records.

D-112


## Service Completion

Service request number 60061510 9178 Date service completed 13 Feb 2024

Agilent signature [Signature] Customer signature [Signature]

Total number of pages in this document \_\_\_\_\_

Revision: 2.00, Issued: December 30, 2020  
Agile Document Number: D0007063  
DE number: 44166.7597222222  
© Agilent Technologies, Inc. 2020

Page 1 of 1  
 Agilent

 Agilent

## Introduction

This checklist covers the following model(s):

Type	Model
SQ	5973 Series MSD
SQ	5975 Series MSD
SQ	5977 Series MSD
TQ	7000 Series MS/MS
TQ	7010 Series MS/MS
QTOF	7200 Series QTOF
QTOF	7250 Series QTOF

## Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures. Customers are responsible for regular maintenance and are encouraged to observe the service representative.
- Any parts not included in the Parts Lists section of this document are not part of the recommended Preventive Maintenance service nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.

## Customer Responsibilities

Customers should ensure that all necessary operating supplies, consumables, and usage-dependent items such as gases, vials, syringes, calibrant solution and solvents required for successful preventive maintenance are available. A customer representative should be available while the preventive maintenance is being performed.

## Important notice for customers

The customer should complete the following before the Support Provider arrives on site:

- Perform an autotune and retain the printed tune report just prior to the start of the PM to verify performance of the equipment.

**Note:** it is recommended to have the customer run the autotune and tune evaluation prior to the PM and then start the vent cycle so that the instrument will be ready for the service representative.

## Important Customer Web Links

- To access Agilent training and education, visit <http://www.agilent.com/chem/training> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilentresources>. The following information topics are available:
  - Sample Prep and Containment
  - Chemical Standards
  - Analysis
  - Service and Support
  - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>
- Need to place a service call?** Flexible Repair Options | Agilent

## Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.

- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Service not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in order by sections: Review, System Checks, Pump maintenance, Cleaning System and Filters, then System Post Check.
  - The tasks in each section may be completed in the most logical order relevant to the system. Complete the **Service Review** section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Add relevant page numbers to selected pages and complete the total number of pages field in the Service Verification section
- Complete Signature Page and attach Signature Page to Service Order.

### Additional Instruction Notes

- Preventive maintenance is a factory recommended procedure designed to reduce the likelihood of electromechanical failures. Failure to perform preventive maintenance may reduce the long-term reliability of certain instruments and systems. Two preventative maintenances (PMs) per year are recommended, the Major PM Service will be performed annually with an Interim PM performed 6 months after the Major PM.

### Definition of the Task/Recommended items within the document

Task	Recommended			
	Yes	No	Interim	As Needed
✓				
✓				
			✓	
				✓
				✓

Yes selected means that the task was done or the part was required  
 No selected means that the task was not done or the part was not required.  
 Interim selected means that this task is recommended to be done at 6-month intervals  
 Major selected means that this task is recommended to be done yearly, if the customer would like a service to be done at the 6-month interval then the service could be purchased  
 As needed selected means that the task was done, or the part was used as needed. For example, there could be two types of filters that could be used, and this was the one selected.

## Instrument Maintenance

Select the appropriate service to be performed.

- ☐ Interim Preventive Maintenance (when available, is typically 6 months or at the request of the customer)
- ☒ Major Preventive Maintenance (Yearly)
- ☐ Enhanced Preventive Maintenance (when available, is provided "As needed")

## System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID	Instrument System Site and Location
	SECOT, Bangkok

List System Component Product Numbers	List the Serial Numbers of each Component
1. G3172A	US13343001
2.	
3.	
4.	
5.	
6.	

## Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components and implementation of Service Notes
- ☒ Check firmware version(s). Updating to the most current versions is strongly recommended. Verify with the customer before updating.

## Preventive Maintenance Procedures

☐ Service Not Applicable

## Interim / Major Preventive Maintenance – GCMS

Yes/No	Interim/Major	Description
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Perform general inspection of system for cleanliness
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Discuss any problems the customer is having with the instrument
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Review customer maintenance records and exclude maintenance on recently serviced items
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Review the most recent autotune report. This will give a starting point for evaluating spectral peaks, baseline noise, peak shape, mass assignments and resolution.

## Interim / Major Preventive Maintenance – System Checks

☐ Service Not Applicable

Yes/No	Interim/Major	System Checks
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Verify that calibration peaks were seen prior to starting the PM
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Vent the instrument
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Inspect vacuum hoses, pump, exhaust tubing, and power cords for excessive wear.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Visually inspect calibrant levels – PFTBA PFDTD (if appl.), IRM (if appl.). Refill if available.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Look for any obvious external damage or problems.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Clean air intake(s). Cosmetic cover(s) may need to be removed.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Verify system line voltage meets instrument specifications: Yes <input type="checkbox"/> No <input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>	For HydroInert systems, verify customer is running hydrogen: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

## Interim / Major Preventive Maintenance – Wet Mechanical vacuum pumps

☐ Service Not Applicable

Yes/No	Interim/Major	Wet Mechanical vacuum pumps
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Check for evidence of oil leakage. Check pump gasket for leakage.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	GC/MS SQ with diffusion pump; drain and replace diffusion pump oil.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Drain and replace mechanical pump oil.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Replace Oil Mist Filter if applicable.

Yes/No	Interim/Major	Wet Mechanical vacuum pumps
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Discuss with customer the need for more frequent oil changes if the oil is dirty
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Don't use mist filters with Chemical Ionization.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Perform anti-suckback valve test. Power on until side plate is held closed, power off and check that side plate holds closed. Visually confirm that no oil returns up vacuum hose.

## Interim / Major Preventive Maintenance – Dry Mechanical vacuum pumps - Diaphragm

☒ Service Not Applicable

Yes/No	Interim/Major	Dry Mechanical vacuum pumps - Diaphragm
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Check for evidence of poor vacuum – Turbo power demand, poor manifold vacuum, etc.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Clear air flow paths of dust.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If vacuum is poor, then replace the diaphragm pump.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Perform anti-suckback valve test. Power on until side plate is held closed, power off and check that side plate holds closed.

## Interim / Major Preventive Maintenance – Dry Mechanical vacuum pumps - Scroll

☒ Service Not Applicable

Yes/No	Interim/Major	Dry Mechanical vacuum pumps - Scroll
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Replace the tips seal on the IDP pump.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Check for evidence of poor vacuum – Rough vac pressure, turbo power demand, poor manifold vacuum, etc.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Replace the Exhaust Filter if required.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Discuss with customer the need for more frequent changes, if needed.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Inform customer that pump gas ballast should be installed all the time.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Perform anti-suckback valve test. Power on until side plate is held closed, power off and check that side plate holds closed.

## Interim / Major Preventive Maintenance – Cleaning System and Filters

☐ Service Not Applicable

Cleaning System and Filters	
Yes/No	Description
Fans	
<input checked="" type="checkbox"/>	Remove dust from fans and vent covers.
<input checked="" type="checkbox"/>	Verify fans are functional and that there is enough space around the instrument for proper cooling.
Source cleaning (all sources <b>except</b> HydroInert)	
<input checked="" type="checkbox"/>	Open analyzer and remove the source.
<input checked="" type="checkbox"/>	Disassemble, Clean, Re-assemble source. (7200, also, remove and clean entrance lens)
<input checked="" type="checkbox"/>	Re-install source and close analyzer.
HydroInert Source	
<input type="checkbox"/>	Source <b>NOT</b> to be abrasively cleaned. No cleaning required at PM. If a decrease in performance is observed, recommend to the customer that filaments, insulators (repeller and extractor), extractor lens, and repeller lens may need to be replaced to restore performance. HydroInert source should not be run with helium carrier.
Filters	
<input checked="" type="checkbox"/>	Replace RMS1+2 Helium gas filter (collision cell gas) – if applicable.
<input checked="" type="checkbox"/>	Replace RMSN+2 Nitrogen gas filter (collision cell gas) – if applicable.
<input checked="" type="checkbox"/>	Replace RMSHY-2 Hydrogen gas filter (HydroInert and JetClean) – if applicable.
<input checked="" type="checkbox"/>	CP17973 – Gas Clean GS/MS Filter (for He, N2 or H2 carrier) – if required
<input checked="" type="checkbox"/>	5190-9071 – Methane Gas Filter (CI systems) – if applicable

**Guidance:** Gas filters need to be changed only if required (ie indicating traps show color change, or if Big Universal Trap are approaching saturation based on time installed or number of gas cylinders changed for that trap)

## Interim / Major Preventive Maintenance – System Post Check

☐ Service Not Applicable

System post-check	
Yes/No	Description
<input checked="" type="checkbox"/>	Pump system back down. Wait until system stability has been achieved.
<input checked="" type="checkbox"/>	Verify system vacuum reading(s) via the gauge controller.
<input checked="" type="checkbox"/>	Leak Check
<input checked="" type="checkbox"/>	Verify system in manual tune
<input checked="" type="checkbox"/>	Compare against previous tune file report(s)
<input checked="" type="checkbox"/>	Change to Tune and verify that all temperatures, pressures, and gas flows reach method set points
<input checked="" type="checkbox"/>	Check manually that you have calibration peaks.
<input checked="" type="checkbox"/>	EI Autotune Performed

**Guidance:** If the PM Service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument setup and checkout.

## Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☒ Complete Signature Page and attach Signature Page to Service Order.

## Test Results

Test Description	Expected Test Result	Actual Test Result

Signature Page

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the service review or other items of interest for the customer, please write in this box.

Service Verification

Service Request Number: 6006590478  
Date of Service Completion: 13 Feb 2024  
Service Engineer Name: Supash N.  
Customer Name: [Signature]  
Service Engineer Signature: [Signature]  
Total number of pages in this document: 10

Interim / Major Preventive Maintenance – System Post Check

☐ Service Not Applicable

System post-check	
Yes/No	Interim/Major Description
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Pump system back down. Wait until system stability has been achieved.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Verify system vacuum reading(s) via the gauge controller.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Leak Check
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Verify system in manual tune
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Compare against previous tune file report(s)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Change to Tune and verify that all temperatures, pressures, and gas flows reach method set points
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Check manually that you have calibration peaks.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> EI Autotune Performed

Guidance: If the PM Service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument setup and checkout.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☒ Complete Signature Page and attach Signature Page to Service Order.

Test Results

Test Description	Expected Test Result	Actual Test Result

## Parts for consumption during PM

### Common Oil and MS Gas Filters – 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	Interim	Major	As Needed
Agilent AVF Platinum, 1 quart	5191-5853	✓	✓	✓
Helium gas filter* (collision cell gas) – if required	RMSH-2		✓	✓
Nitrogen gas filter* (collision cell gas) – if required	RMSN-2		✓	✓
Hydrogen gas filter* (HydroInert and JetClean) – if required	RMSHY-2		✓	✓
Chemical Ionization Gas Purifier (CI systems) (Methane) – if required	5190-9071		✓	✓
Gas Clean GS/MS Filter (for He, N2 or H2) – if required	CP17973		✓	✓
# Gas Clean Filter Kit GC/MS 1/8 in (complete replacement kit - bench mounted) – if required	CP17974			✓
# Gas Clean Carrier Gas Kit for 7890 for He, N2 or H2, Bracket, Mount and Filter – if required	CP17988			✓
# Gas Clean Carrier Gas Kit for 8890 & 8860 for He, N2 or H2, Bracket, Mount and Filter – if required	CP179880			✓

Gas filters need to be changed only if required (ie indicating traps show color change, or if Big Universal Trap are approaching saturation based on time installed or number of gas cylinders changed for that trap)

\* Big Universal Trap (BUT), 1/8" fittings

\* HydroInert and JetClean Systems

# Alternate Gas Clean kit part numbers. A Gas Clean filter is included in the kits. They are only necessary if replacing carrier gas Big Universal Traps with indicating traps

### MS Maintenance Supplies for 5973/5975/5977 Series

Part Description	Part Number	Interim	Major	As Needed
Diffusion pump fluid (Diffusion Pump Models) Qty 2	6040-0809		✓	✓
Exhaust oil mist trap (threaded) Edwards/Pfeiffer	G1099-80039	✓	✓	✓
DS42 Oil Mist Eliminator 3/4" & 3/8"	SR03706556	✓	✓	✓
IDP-3 Tip Seal Replacement Kit (IDP-3 Dry Scroll Pump Models – Includes tip seal, 60mm filter element, tools, mask and cleaning supplies)	G7077-67018	✓	✓	✓
IDP-3 Tip Seal Replacement Kit (no tools – CSD P/N)	5190-9551	✓	✓	✓
IDP-3 Tip Seal Replacement Kit (no tools – VPD P/N)	IDP3TS	✓	✓	✓
Filter element for IDP-3 (diameter: 60mm)	REPLSLRFLTR2	✓	✓	✓

### MS Maintenance Supplies for 7000/7010 Series

Part Description	Part Number	Interim	Major	As Needed
Oil Mist Filter: RV5	G6600-80043	✓	✓	✓
IDP-10 Tip Seal Replacement Kit (IDP-10 Dry Scroll Pump Models – Includes tip seal, 102mm filter element, tools, mask and cleaning supplies)	G7004-67023	✓	✓	✓
IDP-10 Tip Seal Replacement Kit (no tools etc. – VPD P/N)	X3807-67000	✓	✓	✓
Filter element for IDP-10/IDP15 (diameter: 102mm)	REPLSLRFLTR	✓	✓	✓
Filter element for IDP-10/IDP15 (diameter: 79mm)	REPLSLRFLTR1	✓	✓	✓

### MS Maintenance Supplies for 7200/7250 Series

Part Description	Part Number	Interim	Major	As Needed
RIS Probe Maintenance Kit (7200 Series only)	G7005-60170		✓	✓
DS202 Oil Mist Eliminator	SR03706900	✓	✓	✓
DS202 3/8" Magnetic Plug and Gasket	SR03701824	✓	✓	✓
IDP-15 Tip Seal Replacement Kit (IDP-15 Dry Scroll Pump Models – Includes tip seal, 102mm filter element, tools, mask and cleaning supplies)	5190-9613	✓	✓	✓
IDP-15 Tip Seal Replacement Kit (no tools etc. – VPD P/N)	X3815-67000	✓	✓	✓
Filter element for IDP-10/IDP15 (diameter: 102mm)	REPLSLRFLTR	✓	✓	✓
Filter element for IDP-10/IDP15 (diameter: 79mm)	REPLSLRFLTR1	✓	✓	✓

### HydroInert Source Supplies

To determine if replacement of HydroInert parts is required, please review tune history and sample signal intensity performance. If performance is decreasing, the below parts maybe use to restore performance as part of the PM.

One way to determine if the source performance on SQ is being affected is to review the gain factor history in autotune reports or tune history csv file. If the gain factor is increasing the source performance maybe degrading.

Since TQ tunes to a fixed gain factor, review PFTBA abundance. If PFTBA abundance is decreasing over time, the source performance maybe degrading.

Real sample/standard area counts are another way to determine the performance, there could also be other factors that affect compounds abundance such as inlet and column status.

Part Description	Part Number	Interim	Major	As Needed
Repeller Insulator (Qty 2)	G1099-20133			✓
Lens insulator for Extractor (ring insulator)	G3870-20445			✓
HydroInert Extractor lens (9mm)	G7078-20909			✓
HydroInert Repeller	G7078-20902			✓

## Common Parts Reference

(Purchased by customer, not included as part of PM)

### Filaments and Calibrant Supplies 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	SQ	TQ	QTOF
EI High Temperature Filaments	G7005-60051 Qty 2	597X	7000x	N/A
HES EI Filaments	G7002-60001	597B/C	7010x	N/A
LE-EI Filaments (7250 QTOF)	G3850-60021	N/A	N/A	7250
CI High Temperature Filament - SQ, TQ, 7200 QTOF	G7005-60072	N/A	N/A	7200A/B
Axial CI Filament, W/Re Straight (7250 QTOF)	G7250-60095	N/A	N/A	7250
PFTBA GCMS Tuning Standard calibrant	G5971-60571	597X	70X0	72X0
PFDTD calibrant, 1 mL	8500-8510	597X	70X0	72X0
PFET, IRM calibrant for GC QTOF 0.5 mL (7200)	5190-0531	N/A	N/A	7200A/B

### Transfer line seals and springs 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	SQ	TQ	QTOF
CI Interface tip seal (ceramic tip and spring combo) (non-captured CI tip seal interface) (5973, 5975, 7000B)	G1999-60412	5973, 5975	7000B	N/A
CI Interface tip seal (ceramic tip and spring low/non-magnetic spring combo) (non-captured CI tip seal interface) (7010A)	G7002-60412	N/A	7010A	N/A
CI Interface tip seal spring (spring only)	G1999-20023	597X	70X0	72X0
CI Interface tip seal (tip only) (captured style)	G3870-20542	5977x	70X0	72X0
Transfer-Line Tip Base, Threaded (captured style)	G3870-20548	5977x	70X0	72X0
Transfer-Line Tip Cap, Threaded (captured style)	G3870-20547	5977x	70X0	72X0
RIS Xfer Tip (7200)	G7005-20542	N/A	N/A	7200A/B
RIS Xfer Tip Spring (7200)	G7005-20024	N/A	N/A	7200A/B

### MS Maintenance Supplies for Intuvo 9000 MS Series

Part Description	Part Number	SQ	TQ	QTOF
Swaged MS Tail - Packaged	G4590-60009	5977x	7000	N/A
Swaged MS Tail (HES) - Packaged	G4590-60109	5977x	7010x	N/A

## Ion source insulators for 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	SQ	TQ	QTOF
Repeller insulator (SQ, TQ)	G1099-20133 Qty 2	597X	7000x	N/A
Lens insulator for extractor lens (ceramic ring insulator) (Extractor source)	G3870-20445	5977x	7000C/D/E	N/A
Lens insulator for Extractor lens (Vespel ring insulator) (7000B extractor ion source)	G7000-20445	N/A	7000B only	N/A
Lens stack insulator for SS, Inert, Extractor sources (Captures ion focus and entrance lens) (Vespel)	G3170-20530	597X	7000x	N/A
Lens insulator for Extractor lens for HES/LEI (Ceramic ring insulator)	G7002-20064	5977B/C	7010x	7250
Lens stack insulator/holder for HES/LEI (Vespel)	G7002-20074	5977B/C	7010x	7250
CI Repeller Lens Insulator (SQ, TQ)	G1999-20433	597X	70X0x	N/A
CI Lens stack insulator (SQ, TQ) (Vespel)	G3170-20540	597X	70X0x	N/A
Repeller insulator (7200 RIS) (Ceramic)	G7005-20447	N/A	N/A	7200A/B
Extractor Lens Insulator (7200 RIS) (Vespel)	G7005-20133	N/A	N/A	7200A/B
Ion Focus Insulator (7200 RIS) (Vespel)	G7005-20442	N/A	N/A	7200A/B
CI Repeller Insulator/bushing (7200 RIS) (Ceramic)	G7005-20030	N/A	N/A	7200A/B

### HydroInert coated lenses for 5977/7000 Series

Part Description	Part Number	SQ	TQ	QTOF
HydroInert Repeller	G7078-20902	5977x	7000C/D/E	N/A
Ext Source Body - HydroInert	G7078-20903	5977x	7000C/D/E	N/A
HydroInert Extractor lens (9mm)	G7078-20909	5977x	7000C/D/E	N/A
Ion Focus Lens - HydroInert	G7078-20905	5977x	7000C/D/E	N/A
Entrance Lens - HydroInert	G7078-20904	5977x	7000C/D/E	N/A

## Heater/Sensor assemblies for 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	SQ	TQ	QT/OF
Stainless Steel Heater/Sensor assembly (SST EI 350)	G3870-67180	597X	N/A	N/A
Inert Heater/Sensor assembly (Inert EI 350)	G3870-67179	597X	7000A/B	N/A
Extractor Heater/Sensor assembly (Xtr EI 350)	G3870-67177	5971x	7000C/D/E	N/A
H2 EI Heater/Sensor Assembly - HydroInert (H2 EI 350)	G7078-67910	5977x	7000C/D/E	N/A
CI 350 Heater/Sensor Assembly (CI 350)	G3870-67415	597X	70X0x	N/A
Ring heater/sensor assembly (HES, RIS and LEEI) (ceramic ring)	G7002-60058	5977B/C	7010x	72X0

## Rough pump hoses 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	SQ	TQ	QT/OF
Foreline Hose - Imbedded spring	G7077-60119	597X	70X0x	72X0

## Common MS Maintenance Supplies

Part Description	Part Number	SQ	TQ	QT/OF
Abrasive paper, 30 µm	5061-5896	597X	70X0	72X0
Alumina powder	393706201	597X	70X0	72X0
Cloths, clean (pkg of 15)	05980-60051	597X	70X0	72X0
Cloths, cleaning (pkg of 300)	9310-4828	597X	70X0	72X0
Cotton swabs (pkg of 100)	5080-5400	597X	70X0	72X0
Gloves, clean, large	8650-0030	597X	70X0	72X0
Gloves, clean, small	8650-0029	597X	70X0	72X0

Teledyne Tekmar ATOMX Purge and Trap  
Preventive Maintenance Checklist - Standard

Agilent Technologies

Agilent Preventive Maintenance provides factory recommended service for your analytical systems to assure reliable operation and the accuracy of your results. Delivered by highly-trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak.

For more information about Agilent Technologies services please visit our web site using the following URL <http://www.chem.agilent.com/en-us/products/services/pages/default.aspx>

## Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- Any parts, not included in the Parts Lists section of this document, are not part of the recommended Preventive Maintenance service, nor are they included in the price of this service.
- If a system requires the use of additional or special procedures and/or parts for the instrument service, then these must be ordered separately and charged as a repair, which may incur additional costs.

## Service Engineer's Responsibilities

- Only complete/printout pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using a "X" or tick mark "✓" in the checkbox.
- Complete Not Applicable check boxes to indicate services not delivered, as needed.
- Complete the PM service in the order of the tasks listed.
- Complete the Service Review section together with the customer.

## System Information

### Guidance

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument system name and ID	Instrument system site and location
	SECT, Bungkok
List system component product numbers	List the serial numbers of each component
1. TMK - ATOMX	1. US 12241002
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.

### Preparation

- ☒ Discuss any specific issues with the customer prior to starting.
- ☒ Review the instrument logbook.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform general inspection of system for cleanliness.
- ☒ Check for proper installation of safety-related parts, assemblies, sensors etc
- ☒ Check for required firmware updates and verify with customers if they would like it installed.

## Check External Supplies

- ☐ Section NOT Applicable
- ☒ Verify the gas source is supplying an input pressure of 50 - 100 psi to the ATOMX. If the customer is using a gas cylinder, verify the cylinder is at 500+ psi.
- ☒ Verify that the waste container has sufficient volume to contain the waste generated. Empty if necessary.
- ☒ Replace the DI water supply with fresh DI water.
- ☒ Make sure the DI water supply is sufficient for sample analysis (1 Liter minimum)
- ☒ Make sure the methanol supply is sufficient for sample analysis.

## Atomx Leak and Pressure Check

- ☐ Section NOT Applicable
- ☒ Scan through the sample log to verify that the purge pressures are staying consistent throughout the daily runs.
- ☒ Use the Teklink software to check the standard pressure.
- ☒ Run a leak check to ensure that the unit is leak tight.

## Inspect ATOMX Hardware

- ☐ Section NOT Applicable
- ☒ Check the tray vial holes for foreign particles. Clean if necessary.
- ☒ Inspect the needle for particles or sample build up. Clean if necessary.
- ☒ Inspect the sparger glassware for damage and/or discoloration that could restrict flow or cause contamination. Replace if necessary.
- ☒ Inspect the drain tubing for clogging. Replace the drain line if necessary.
- ☒ Lubricate the ATOMX Carousel Drive. Refer to the diagram on page 6-25 of the ATOMX User Manual for lubrication points. Teledyne Tekmar recommends using DuPont Krytox lubrication.
- ☒ Lubricate the ATOMX Elevator. Refer to the diagram on page 6-32 of the ATOMX User Manual for lubrication points. Teledyne Tekmar recommends using DuPont Krytox lubrication.

## Restore Instrument

### Guidance

If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Teledyne Tekmar ATOMX Purge and Trap  
Preventive Maintenance Checklist - Standard**Service Review**

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the PM service activity in the customer's instrument records/logbook
- ☒ Update/reset instrument maintenance counters as appropriate
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section below if there are additional comments
- ☒ Review the service and any test results with the customer.
- ☒ If the Instrument firmware was updated, record the details of the change in the Service Engineer's Comments box below or if necessary, in the customer's IQ records.

**Product or Product Type Test Results Table**

Test Description	Expected Test Result	Actual Test Result
Leak Test	Pass	Pass

**Product or Product Type Parts List Table**

Part Description	Part Number	Product or Model# where used	Quantity Consumed
Sparter Glassware	Ask the customer what size sparger glassware they are using; refer to the ATOMX parts list for part numbers.	TMR-ATOMX	1
Lubricant, Dupont Krytox	15-0293-000	TMR-ATOMX	1
Tubing, Drain, Self Retracting	15-0087-002	TMR-ATOMX	1

Teledyne Tekmar ATOMX Purge and Trap  
Preventive Maintenance Checklist - Standard**Service Engineer Comments (optional)**

If there are any specific points you wish to note as part of performing the service or other items of interest for the customer, please write in this box.

**Other Important Customer Web Links**

- ☐ How to get information on your product: Literature Library - <http://www.agilent.com/chem/library>
- ☐ Need to know more? - [www.agilent.com/chem/education](http://www.agilent.com/chem/education)
- ☐ Need technical support, FAQs? - [www.agilent.com/chem/techsupport](http://www.agilent.com/chem/techsupport)
- ☐ Need supplies? - [www.agilent.com/chem/supplies](http://www.agilent.com/chem/supplies)

**Service Completion**

Service request number 6006590978

Date service completed 13 Feb 2019

Agilent signature

Customer signature

Number of pages in this document

## **DIGITAL LIGHT METER**

**Model : LX-72**

**Serial No. : Q608662**

# CALIBRATION CERTIFICATE

Issued date: 30 May 2023

Client Name : **EASTERN THAI CONSULTING 1992 CO., LTD.**  
Address : 683 Moo 11, Sukhaphibarn 8 Rd., Nongkham, Siracha, Chonburi 20230.

Request No : **C-2305 - 238**

Laboratory No.: **CAL- 238**

Date of Request: 30 May 2023.

Date of Calibration: 30 May 2023.

## 1. Unit Under Calibration (UUC) :

Nomenclature : Digital Light Meter

Maker : DIGICON

Serial No.: Q 608662

Model : LX-72

## 2. Place of Calibration: Photometry Standard Laboratory, INTERNATIONAL TESTING SERVICE CO., LTD.

## 3. Range of Calibration: 3 Range

## 4. Condition of Laboratory: Ambient temperature: (25 ± 2) °C and relative humidity (60 ± 20) %.

## 5. Reference Standard: Standard Tungsten Halogen Lamp, Serial No.: 504011, which was calibrated on 5 October 2022, can be traceable to International System of Unit (SI) through National Institute of Metrology (Thailand), Certificate No.: TP-1024-22.

## 6. Support Equipment:

1. Photometric bench, 6.3 meter long.
2. DC. power supply, Serial No.: EJ 19A 009, Model: GPR-25H 300, Maker: GW INSTR.
3. Digital Multimeter, Model: 34401A, S/N: MY44011212 and MY44011215.
4. Foot Candle / Lux Meter, Model: 407026, S/N: Q 558437, Maker: EXTECH.

## 7. Calibration Procedure:

The measurement was done in accordance with WI-CP-01. The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level of confidence of approximately 95 %.

Page 1 of 2

The Results shown in this certification report refer only to the equipment(s) calibrated unless otherwise stated  
This Calibration Certificate cannot be reproduced, except in full, without permission of company.

Request No: **C-2305 - 238**

Laboratory No.: **CAL - 238**

## Results :

UUC Range	Standard (lx)	UUC Reading (lx)		Correction (lx)	Uncertainty of Measurement (± lx)
		Before adjust	After adjust		
400	0	---	---	---	---
	50	49.2	49.9	+ 0.1	2.0 % of Reading
	100	98.8	100.0	0.0	
	200	198.6	200.4	- 0.4	
	300	293.0	296.2	+ 3.8	
4000	400	386.2	389.4	+ 10.6	
	500	482	501	- 1	
	1000	960	998	+ 2	
X10	2000	1906	1990	+ 10	
	3000	2844	2962	+ 38	
	4000	3745	3915	+ 85	
	5000	466	486	+ 140	

Note : 1. The results relate only to the items calibrated.

2. The UUC is not read out at zero lux and it was calibrated at 5000 lx is not NSC-ONSC Accredited.

Calibration result approved by

Approved on behalf of  
International Testing Service Co., Ltd

(Mr. Yuttana Tholueng)

(Mr/Pichit Vivat-Anant )  
Managing Director

Page 2 of 2

The Results shown in this certification report refer only to the equipment(s) calibrated unless otherwise stated  
This Calibration Certificate cannot be reproduced, except in full, without permission of company.

**ANALYTICAL BALANCE (DU)**

**Model : XS205DU**

**Serial No. : 1126323724**

Certificate No. : 23-148799

Sample Code : 23-56200-001

## CERTIFICATE OF CALIBRATION

Customer

: EASTERN THAI CONSULTING 1992 CO., LTD.

683 Moo 11, Sukhapibarn 8 Rd., Nongkham,

Siiracha, Chonburi 20230

Location of Calibration

: EASTERN THAI CONSULTING 1992 CO., LTD.

(Analytical Balance Room)

Equipment

: ELECTRONIC BALANCE

Manufacturer

: METTLER TOLEDO

Model

: XS205DU

Serial No.

: 1126323724

ID No.

: LABE 05/1

Date of Receipt

: 22 December 2023

Date of Calibration

: 22 December 2023

Calibrated by

Mr. Somwang Sangdee

Scientist

Approved by

(Mr. Somchai Neampunt)

Signed for Director

Issue date

25 December 2023

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

## REPORT OF CALIBRATION

Equipment :

ELECTRONIC BALANCE

Manufacturer :

METTLER TOLEDO

Model :

XS205DU

Capacity :

Max 81 g / 220 g

Resolution :

0.01 mg / 0.1 mg

Serial No. :

1126323724

ID No. :

LABE 05/1

### Result of Calibration

#### 1. Test weight and repeatability of reading

Repeatability is a measure of the ability of a balance to supply the same result in repetitive weighings with one and the same load under the same measurement condition. The measurement of the repeatability must include both the balance specifications and the ambient (vibration, fluctuating air current/temperature/humidity, etc.) Operator handling of the balance is also included in the standard deviation.

Unit : g	Range : 80	<input checked="" type="checkbox"/> Before adjustment	<input checked="" type="checkbox"/> After adjustment
<input type="checkbox"/> No adjustment	Nominal value	40 80 40 80	
<input checked="" type="checkbox"/> Adjustment	Standard weight	40.000054 80.000048 40.000054 80.000048	
	Average reading of indicator	40.000026 80.000037 40.000017 80.000017	
	Standard deviation	0.000015 0.000016 0.000008 0.000009	
Unit : g	Range : 200	<input checked="" type="checkbox"/> Before adjustment	<input checked="" type="checkbox"/> After adjustment
<input type="checkbox"/> No adjustment	Nominal value	100 200 100 200	
<input checked="" type="checkbox"/> Adjustment	Standard weight	100.000042 200.000041 100.000042 200.000041	
	Average reading of indicator	100.00003 200.00004 100.00001 200.00001	
	Standard deviation	0.000005 0.000005 0.000003 0.000003	

COPY



Certificate No. : 23-148799

Sample Code : 23-56200-001

## REPORT OF CALIBRATION

## Result of Calibration

## 2. Sensitivity or value of a scale division

Change in the output variable of a measuring instrument divided by the associated change in the input variable.

Unit : g

Range : 80 200

Test Point	Sensitivity, S	Test Point	Sensitivity, S
0	1.00748	0	1.0274
40	0.98753	100	0.9975
80	0.99751	200	0.9975

## 3. Departure of indication from nominal value, Linearity

Unit : g

Nominal Value	Standard Value	Average Reading of Indicator	Correction Value	Expanded Uncertainty	Coverage Factor (k)
Unload	0.0000000	0.00000	0.00000	0.000012	2.05
0.01	0.0100025	0.01000	0.00000	0.000012	2.05
0.1	0.1000019	0.10001	-0.00001	0.000013	2.03
1	1.0000125	1.00001	0.00000	0.000015	2.02
5	5.0000208	5.00004	-0.00002	0.000021	2.00
10	10.0000004	10.00008	-0.00008	0.000026	2.00
20	20.0000030	20.00011	-0.00008	0.000036	2.00
50	50.0000014	50.00014	-0.00013	0.000068	2.00
100	100.0000042	100.0001	-0.0001	0.00016	2.00
150	150.0000056	150.0001	0.0000	0.00022	2.00
200	200.0000041	200.0002	-0.0002	0.00027	2.00

COPY

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.



Certificate No. : 23-148799

Sample Code : 23-56200-001

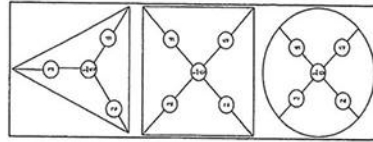
## REPORT OF CALIBRATION

## Result of Calibration :

## 4. Eccentric or off-centre loading

Deviation of the measurement value through off - center (eccentric) loading. The corner load increases with the weight of the load and its removal from the center of the pan support.

Weighing pan ☐ Circle ☐ Triangular ☒ Rectangular  
Test weight : 50 and 100  
Unit : g



Range	Position	Reading of indicator	Reading of indicator
1	50.00015	100.0001	100.0001
2	50.00022	100.0001	100.0001
3	50.00008	100.0001	100.0001
4	50.00002	100.0000	100.0000
5	50.00016	100.0002	100.0002
6	50.00014	100.0001	100.0001
Maximum difference	0.00013	0.0001	0.0001

## Condition of Calibration

1. Calibration Method : WI-CL-004 base on UKAS LAB 14: 2019

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

3. Condition of Calibration item: Normal

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

Through the reference standard laboratory of Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (Instrument number 1).

5. Reference standard instrument :

Instrument

1) STANDARD WEIGHT 1 mg to 1 kg

Class

E2 LB-WE-79

Certificate No.

23-105642

Due Date

10 September 2024

- End of Report -

COPY

## **BAROMETER**

**Equipment : Analog Barometer**

**ID No. / Tag No. : BM001/41**



CALIBRATION CERTIFICATE

Certificate No. : L202305085-002  
Date Issued : 16-May-23

**Customer** : Eastern Thai Consulting 1992 Co., Ltd.  
683 Moo 11 Sukhapibarn 8 Rd., Nongkham, Sitracha, Chonburi 20230

**Equipment** : Analog Barometer

**Manufacturer** : Barigo  
**Model** : -  
**Serial No.** : -  
**ID No./Tag No.** : BM001/41  
**Date Received** : 11-May-23  
**Date Calibrated** : 15-May-23  
**Calibrated by** : Mr. Jame Khaothong

Calibration Method or Calibration Procedure Used

In-house method : CP-21 base on DKD-R 6-1: Edition 3 2014.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level confidence approximately 95 percent.

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

Approved by: *Sorayuth*  
( Mr. Sarayuth Tochua )



Page 1 of 2

COPY

Certificate No : L202305085-002  
Environment Ambient Temperature : (25 ± 2)°C  
Relative Humidity : (50 ± 15)%RH

STD Reading mbar	UUC Reading (mbar) Before Adjusted	UUC Reading (mbar) After Adjusted	UUC Error mbar	Uncertainty ± mbar
990.00	990.0	-	0.00	0.61
1000.00	1000.0	-	0.00	0.61
1010.00	1010.0	-	0.00	0.61
1020.00	1020.0	-	0.00	0.61
1030.00	1030.0	-	0.00	0.61

STD = Standard

UUC = Unit Under Calibration

**Calibrated condition :** Pressure Medium Air : Density = 1.19 kg/m<sup>3</sup> @ 20°C, 1 bar  
Mounting Position Vertical  
Reference Level at center of its dial  
Conversion Factor Multiply by 1.0 E+02 - Pa unit

**Description of UUC :**

Range 990 - 1030 mbar Absolute  
Calibration Range 990 - 1030 mbar Absolute  
Scale Interval 1 mbar  
Resolution 0.5 mbar Absolute

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

**Measurement Standards Used & Traceability :**

The International System of Units (SI) through

IRPC Certificate No. CL1-P220104 for Reference Pressure Monitor Serial No. 1598, Due 11-Nov-23

End of Certificate

Page 2 of 2

COPY

**Hot Air Oven**

**Model : UFE 500**

**Serial No. : G511.0182**



## CERTIFICATE OF CALIBRATION

Page 1 of 3

 Certificate No. : 23-148804  
 Sample Code : 23-56200-006

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.

683 Moo 11, Sukhapibarn 8 Rd., Nongkham,

Siracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.

(Hot Lab)

Equipment : Temperature controlled enclosures (Hot air oven)

Manufacturer : Memmert Model : UFE 500

Serial No. : G511.0182 ID No. : LABE 17/4

Date of Receipt : 22 December 2023 Date of Calibration : 22 December 2023

## Condition of Calibration

1. Environment
- 1.1 Ambient temperature : Maximum 30.9 °C : Minimum 29.6 °C
- 1.2 Relative humidity : Maximum 54.5 % : Minimum 46.8 %
- 1.3 Line voltage supplied : Maximum 227.6 VAC : Minimum 224.2 VAC

## 2. Calibration method

TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

## 3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Data Acquisition With Sensor (RTD-P100)	LB-DA-08 (RTD-248 to RTD-256)	23-084070	06 August 2024

## 4. This certificate is traceable to the international system of unit (SI Unit).

The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

## 5. This result of calibration was found accurate as shown on date and place of calibration only.

## 6. Condition of calibration item : Normal

Calibrated by

Mr. Pisek Into

Scientist

Approved by

(Mr. Somchai Neamput)

Signed for Director

Issue date

25 December 2023

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

361 Soi Ladprao 122, Ladprao Road, Phlaphla, Wang Thonglang, Bangkok 10310 PM CL 016

TEL 02-516-2422 FAX 02-516-6949 Rev 01

CONTACT@AMARC.CO.TH WWW.AMARC.CO.TH Effective Date 15/10/21



## REPORT OF CALIBRATION

Page 2 of 3

 Certificate No. : 23-148804  
 Sample Code : 23-56200-006

## Results of Calibration

Resolution : 0.5 °C

## 1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C)	UUC* reading (°C)	Measured temperature at each positions (°C)										Uncertainty ± (°C)	Coverage factor k
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10		
104	103.5	103.5	104.11	103.94	103.85	103.84	103.97	103.93	103.64	103.31	104.21	104.21	0.47	2.00

## 2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
104	0.04	0.78	0.81

## Notes

UUC\* = Unit Under Calibration

COPY



## REPORT OF CALIBRATION

Certificate No. : 23-148804

Sample Code : 23-56200-006

## Results of Calibration

## Notes

1. Sensor installation locations
  - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
  - 1.2 The reference sensor is preferably located of the geometric center of the chamber.
2. Interior dimensions approx of chamber :  
W = 56 cm ; D = 40 cm ; H = 48 cm
3. Air valve or fresh air level : Off
4. Fan level : Open

5. The quoted uncertainty includes "Stability of chamber and loading effect in chamber at 20% of uniformity".

6. 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.
7. Stability : one-half of the greatest maximum difference of measured temperatures at any one sensor.
8. Overall variation : the difference of the maximum and the minimum measured temperatures throughout observation time.
9. UUC\* reading : the average reading of indicating device that forms the integral part of the enclosure.
10. Calibration results without adjustment.

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty of measurement, multiplied by the coverage factor  $k$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

End of Report

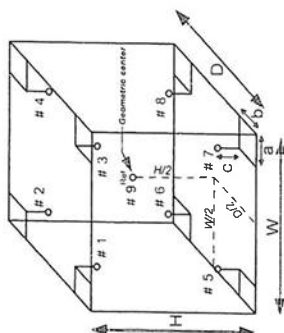


Figure: Example of sensor installation Positions

**COPY**

**Primary Flow Calibrator**  
**Serial No. : 110619 , 207510**

Certificate No : 24-AFM-023  
Request No : Req-2024-0095

Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)
24.80	101.23	0	0.00	0.0000	0.0038
24.40	101.18	50	49.629	-0.4	3.3
24.40	101.16	100	100.73	0.7	2.8
24.30	101.13	200	198.30	-1.7	5.6
24.30	101.10	300	298.14	-1.9	8.4
24.40	101.06	400	397.45	-3	11
24.20	101.00	500	496.93	-3.1	7.1

Note  
STD : Standard UUC : Unit Under Calibration

- UUC Reference Condition : At atmospheric pressure and room temperature condition
- Flow Rate was corrected for non-standard operating condition by using equation

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P} \times \frac{T_{meas}}{T_{ref}}$$

where Q : Flow Rate P = Absolute Pressure T = Absolute Temperature  
Meas = Measurement Condition ref = Standard Condition

\* Indicates non accredited

End of Certificate

COPY

## Certificate of Calibration

Customer : Eastern Thai Consulting 1992 Co., Ltd.  
Name :  
Address : 683 Moo 11, Sukhapibam 8 Rd., Nongkham, Sriracha, Chonburi 20230

Unit Under Calibration Details

Measurement Item : Primary Flow Calibrator

Manufacturer : Bios

Model : Defender 510-I.

Serial Number : 110619

ID : -

Sensor Model : -

Sensor Serial Number : -

Location of Calibration : LAB 4 AIR VELOCITY METER

Calibration Environment and Details

Temperature : 23 °C ± 0.3 °C

Humidity : 55 %RH ± 20 %RH

Barometric Pressure : 1013 hPa ± 10 hPa

Received Date : 11 January 2024

Calibration Date : 30 January 2024

Calibration Procedure : In-house method CPAFM-01 by Comparison technique with Standard Primary Flow Calibrator


Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	12 July 2024
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	12 July 2024
Temperature meter	GT 11	08000037	Qrebon	27 February 2024
Pressure meter	CPG2400	41000KDU651882	TPA	9 November 2024

Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943 01

Note :

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor  $k = 2$ , providing a level of confidence approximately 95 %.

Calibration By :  Mr. Noppadon Luangart  
Service Calibration Engineer  
Approved By :  Mr. Pacit Mathavom  
Calibration Engineer Supervisor  
Issue Date : 30 January 2024

COPY

Certificate No : 24-AFM-022

Request No : Req-2024-0094

Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)
24.80	101.23	0	0.00	0.0000	0.0058
24.70	101.58	101	101.48	0.5	2.8
24.80	101.50	200	201.14	1.1	5.6
24.70	101.50	500	503.87	3.9	7.1
24.80	101.50	1003	1010.1	7	14
24.70	101.60	2002	2014.6	13	29
24.60	101.33	2995	3007.6	13	43
24.60	101.65	4027	4007.5	-19	57
24.50	101.70	5035	5010.7	-24	72

Note

STD : Standard UUC : Unit Under Calibration

- UUC Reference Condition : At atmospheric pressure and room temperature condition
- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P_{meas}} \times \frac{T_{meas}}{T_{ref}}$$

where Q Flow Rate P = Absolute Pressure T = Absolute Temperature  
Meas = Measurement Condition ref Standard Condition

\* Indicates non accredited

End of Certificate

COPY

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.  
FM-708-AFM-01 Rev.01 Issue date 25/01/24

Certificate of Calibration

Certificate No : 24-AFM-022

Request No : Req-2024-0094

Customer

Name : Eastern Thai Consulting 1992 Co., Ltd.  
Address : 683 Moo 11, Sukhaphibam 8 Rd., Nongkham, Sriracha, Chonburi 20230

Unit Under Calibration Details

Measurement Item : Primary Flow Calibrator  
Manufacturer : MesaLabs  
Model : Defender S10-M  
Serial Number : 207510  
ID : -  
Sensor Model : -  
Sensor Serial Number : -

Location of Calibration : LAB 4 AIR VELOCITY METER

Calibration Environment and Details

Temperature : 23 °C ± 3 °C  
Humidity : 55 %RH ± 20 %RH

Barometric Pressure : 1013 hPa ± 10 hPa

Received Date : 11 January 2024

Calibration Date : 30 January 2024

Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	1850 010006	Sensidyne	12 July 2024
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	12 July 2024
Temperature meter	GT 11	08000057	Qreburn	27 February 2024
Pressure meter	CPG2400	41000KDU/651R82	TPA	9 November 2024

Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

Note :

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor k = 2, providing a level of confidence approximately 95 %.

Calibration By :

Mr. Noppadon Luangart  
Service Calibration Engineer

Approved By :

Mr. Pacit Mathavorn  
Calibration Engineer Supervisor

Issue Date :

30 January 2024

COPY

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.  
FM-708-AFM-01 Rev.01 Issue date 25/01/24

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CA8889**

CERTIFICATE OF CALIBRATION

ISSUED BY

Cirrus Research plc

DATE OF ISSUE

19 January 2024

CERTIFICATE NUMBER

206918

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

Page 1 of 2

Approved signatory  
N Smith  
Electronically signed:  


Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer:

Cirrus Research plc

Model:

CR:110A

Serial number:

CA8889

Firmware version:

5.4

Notes:

Eastern Thai Consulting 1992 Co.,Ltd.  
683 Moo.11, Sukaphibal 8 Rd., Nongkham,  
Sriacha, Chonburi 20230

Test summary

Date of calibration:

19 January 2024

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001553
Attenuator	Cirrus Research	ZE.952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	100498

Notes

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

CERTIFICATE OF CALIBRATION

Certificate Number:

206918

Page

2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before

Pressure: 100.96 kPa

Temperature: 21.6 °C

Humidity: 34.6 %

After

Pressure: 100.94 kPa

Temperature: 21.5 °C

Humidity: 34.4 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighing	Complies
Absolute Acoustic Sensitivity	Complies

COPY

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB0640**

CERTIFICATE OF CALIBRATION

ISSUED BY

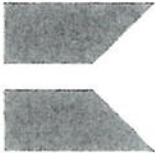
Cirrus Research plc

DATE OF ISSUE

19 January 2024

CERTIFICATE NUMBER

206879



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

Page 1 of 2

Approved signatory

N.Smith

Electronically signed:

Dosemeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer:

Cirrus Research plc

Model:

CR:110A

Serial number:

CB0640

Firmware version:

5.4

Notes:

Eastern Thai Consulting 1992 Co., Ltd.  
683 Moo.11, Sukaphibai 8 Rd., Nongkharn,  
Siracha, Chonbun 20230

Test summary

Date of calibration:

19 January 2024

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001553
Attenuator	Cirrus Research	ZE.952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	100498

Notes

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

CERTIFICATE OF CALIBRATION

Certificate Number:

206879

Page

2 of 2

Environmental conditions

The following conditions were recorded at the time of the test

Before

Pressure: 99.84 kPa

Temperature: 21.4 °C

Humidity: 32.5 %

After

Pressure: 99.87 kPa

Temperature: 21.7 °C

Humidity: 33.5 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

COPY

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB0641**

CERTIFICATE OF CALIBRATION

ISSUED BY  
Cirrus Research plc

DATE OF ISSUE  
19 January 2024

CERTIFICATE NUMBER  
206878



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

Page 1 of 2

Approved signatory  
N.Smith  
Electronically signed  


Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer:  
Model:  
Serial number:  
Firmware version:

Cirrus Research plc  
CR:110A  
CB0641  
5.4

Notes:  
Eastern Thai Consulting 1992 Co., Ltd.  
683 Moo.11, Sukaphitbai 8 Rd., Nongkharn,  
Siracha, Chonburi 20230

Test summary

Date of calibration:  
The calibration was performed respecting the requirements of ISO/IEC 17025:2017.  
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.  
The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

19 January 2024

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001553
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	100498

Notes

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

CERTIFICATE OF CALIBRATION

Certificate Number:  
206878

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before

After

Pressure: 100.96 kPa

Pressure: 100.96 kPa

Temperature: 21.6 °C

Temperature: 21.5 °C

Humidity: 33.5 %

Humidity: 34.9 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

COPY

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB0642**

CERTIFICATE OF CALIBRATION

ISSUED BY

Cirrus Research plc

DATE OF ISSUE

19 January 2024

CERTIFICATE NUMBER

206920



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

Page 1 of 2

Approved signatory

N.Smith

Electronically signed.

Dosemeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer:

Cirrus Research plc

Model:

CR:110A

Serial number:

CB0642

Firmware version:

5.4

Notes:

Eastern Thai Consulting 1992 Co.,Ltd.  
663 Moo.11, Sukaphibai 8 Rd., Nongkham,  
Siracha, Chonburi 20230

Test summary

Date of calibration:

19 January 2024

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001553
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	100498

Notes

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

CERTIFICATE OF CALIBRATION

Certificate Number:

206920

Page

2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before	Pressure: 100.02 kPa	Temperature: 21.9 °C	Humidity: 34.6 %
After	Pressure: 100.03 kPa	Temperature: 21.8 °C	Humidity: 36.1 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

COPY

COPY

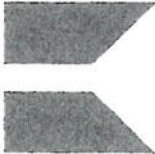
**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB0643**

CERTIFICATE OF CALIBRATION

ISSUED BY      Cirrus Research plc  
DATE OF ISSUE      19 January 2024      CERTIFICATE NUMBER      206871



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

Page 1 of 2  
Approved signatory  
N Smith  
Electronically signed:

*N.D. Smith*

Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer:      Cirrus Research plc      Notes:      Eastern Thai Consulting 1992 Co., Ltd.  
Model:      CR:110A      683 Moo.11, Sukaphibai 8 Rd., Nongkham,  
Serial number:      CB0643      Sriracha, Chonburi 20230  
Firmware version:      5.4

Test summary

Date of calibration:      19 January 2024  
The calibration was performed respecting the requirements of ISO/IEC 17025:2017.  
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.  
The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDQ6R6309
Attenuator	Cirrus Research	ZE:952	93892
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	40088

Notes

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

CERTIFICATE OF CALIBRATION

Environmental conditions

The following conditions were recorded at the time of the test:

Before      Pressure:      100.93 kPa      Temperature:      21.6 °C      Humidity:      36.1 %  
After      Pressure:      100.92 kPa      Temperature:      21.5 °C      Humidity:      35.5 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

Certificate Number:  
206871  
Page 2 of 2

COPY

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB1365**

CERTIFICATE OF CALIBRATION

ISSUED BY  
Cirrus Research plc

DATE OF ISSUE  
19 January 2024

CERTIFICATE NUMBER  
206870

CERTIFICATE OF CALIBRATION

Environmental conditions

The following conditions were recorded at the time of the test:

Before	Pressure: 99.92 kPa	Temperature: 21.7 °C	Humidity: 33.2 %
After	Pressure: 99.96 kPa	Temperature: 21.8 °C	Humidity: 34.2 %



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

Page 1 of 2
Approved signatory N Smith Electronically signed: 

Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer:	Cirrus Research plc	Notes:	Eastern Thai Consulting 1992 Co.,Ltd. 883 Moo 11, Sukaphibai 8 Rd., Nongkham, Sriacha, Chonburi 20230
Model:	CR:110A		
Serial number:	CB1365		
Firmware version:	5.4		

Test summary

Date of calibration: 19 January 2024  
The calibration was performed respecting the requirements of ISO/IEC 17025:2017.  
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.  
The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001553
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	100498

Notes

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

COPY

COPY

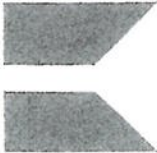
**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB1497**

CERTIFICATE OF CALIBRATION

ISSUED BY      Cirrus Research plc  
DATE OF ISSUE      19 January 2024      CERTIFICATE NUMBER      206868



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

Page 1 of 2
Approved signatory N.Smith Electronically signed: 

Dosemeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer:      Cirrus Research plc      Notes:      Eastern Thal Consulting 1992 Co.,Ltd.  
Model:      CR-110A           663 Moo 11, Sukaphibai 8 Rd., Nongkham,  
Serial number:      CB1497           Sriracha, Chonburi 20230  
Firmware version:      5.4

Test summary

Date of calibration:      19 January 2024  
The calibration was performed respecting the requirements of ISO/IEC 17025:2017.  
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001553
Attenuator	Cirrus Research	ZE-952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC-110A	100498

Notes

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

CERTIFICATE OF CALIBRATION

Certificate Number:  
206868  
Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before      Pressure: 100.13 kPa      Temperature: 22.0 °C      Humidity: 37.0 %  
After      Pressure: 100.15 kPa      Temperature: 21.9 °C      Humidity: 35.4 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

COPY

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB1500**

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc  
DATE OF ISSUE 19 January 2024 CERTIFICATE NUMBER 206866



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

Page 1 of 2  
Approved signatory  
N. Smith  
Electronically signed:

Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc  
Model: CR110A  
Serial number: CB1500  
Firmware version: 5.4  
Notes: Eastern Thai Consulting 1992 Co., Ltd.  
683 Moo.11, Sukaphitai 8 Rd., Nongkham,  
Sriacha, Chonburi 20230

Test summary

Date of calibration: 19 January 2024  
The calibration was performed respecting the requirements of ISO/IEC 17025:2017.  
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.  
The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDQ6R6309
Attenuator	Cirrus Research	ZE-952	93892
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC-110A	40088

Notes

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

CERTIFICATE OF CALIBRATION

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 100.96 kPa Temperature: 21.6 °C Humidity: 34.1 %  
After Pressure: 100.95 kPa Temperature: 21.6 °C Humidity: 34.7 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

COPY

COPY

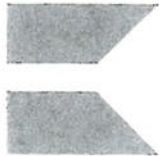
**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CA8888**

CERTIFICATE OF CALIBRATION

ISSUED BY      Cirrus Research plc  
DATE OF ISSUE      19 January 2024      CERTIFICATE NUMBER      206880



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

Page 1 of 2  
Approved signatory  
N Smith  
Electronically signed

*N. Smith*

Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer:      Cirrus Research plc      Notes:      Eastern Thai Consulting 1992 Co., Ltd.  
Model:      CR:110A      683 Moo 11, Sukaphibai 8 Rd., Nongkham,  
Serial number:      CA8888      Sriracha, Chonburi 20230  
Firmware version:      5.4

Test summary

Date of calibration:      19 January 2024  
The calibration was performed respecting the requirements of ISO/IEC 17025:2017.  
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.  
The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001553
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	100498

Notes

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

CERTIFICATE OF CALIBRATION

Environmental conditions

The following conditions were recorded at the time of the test:

Before      Pressure:      100.93 kPa      Temperature:      21.4 °C      Humidity:      34.6 %  
After      Pressure:      100.92 kPa      Temperature:      21.6 °C      Humidity:      35.3 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

COPY

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CA8887**



Cirrus Research plc

Acoustic House

Bridlington Road

Hummanby

North Yorkshire

YO14 0PH

United Kingdom

Page 1 of 2

Approved signatory  
N.Smith

Electronically signed:  


Dosemeter : IEC 61252-1993+A1:2000

**Instrument information**

Manufacturer: Cirrus Research plc      Notes: Eastern Thai Consulting 1992 Co., Ltd.  
Model: CR-110A      583 Moo.11, Sukaphibal 8 Rd., Nongkhham,  
Serial number: CA8887      Sriracha, Chonburi 20230  
Firmware version: 5.4

**Test summary**

Date of calibration: 19 January 2024

The calibration was performed respecting the requirements of ISO/IEC 17025:2017

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment			
Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001553
Attenuator	Cirrus Research	ZE-952	76713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC-110A	100498

Notes

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

CERTIFICATE OF CALIBRATION

Environmental conditions

The following conditions were recorded at the time of the test:

Before	Pressure: 100.93 kPa	Temperature: 21.6 °C	Humidity: 35.4 %
After	Pressure: 100.92 kPa	Temperature: 21.6 °C	Humidity: 36.4 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

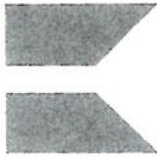
COPY

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB1499**



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

Page 1 of 2

Approved signatory  
N Smith

Electronically signed:

Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc  
Model: CR:110A  
Serial number: CB1499  
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co.,Ltd.  
683 Moo.11 Sukaphibai 8 Rd., Nongkham,  
Sriracha, Chonburi 20230

Test summary

Date of calibration: 19 January 2024

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDD06R6309
Attenuator	Cirrus Research	ZE-952	93892
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	40088

Notes

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

Environmental conditions

The following conditions were recorded at the time of the test:

Before	Pressure: 100.90 kPa	Temperature: 21.3 °C	Humidity: 31.5 %
After	Pressure: 100.91 kPa	Temperature: 21.5 °C	Humidity: 32.6 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

COPY

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB0644**

CERTIFICATE OF CALIBRATION

ISSUED BY

Cirrus Research plc

DATE OF ISSUE

19 January 2024

CERTIFICATE NUMBER

206923

Cirrus Research plc

Acoustic House

Bridlington Road

Hunmanby

North Yorkshire

YO14 0PH

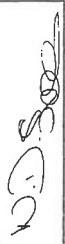
United Kingdom

Page 1 of 2

Approved signatory

N.Smith

Electronically signed:



Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc  
Model: CR:110A  
Serial number: CB0644  
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co.,Ltd.  
683 Moo.11, Sukaphibai 8 Rd., Nongkham,  
Sriracha, Chonburi 20230

Test summary

Date of calibration: 19 January 2024

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001553
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	100498

Notes

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

CERTIFICATE OF CALIBRATION

Certificate Number:

206923

Page

2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 100.90 kPa Temperature: 21.4 °C Humidity: 33.0 %  
After Pressure: 100.93 kPa Temperature: 21.6 °C Humidity: 32.2 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

COPY

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB1498**

CERTIFICATE OF CALIBRATION

ISSUED BY  
Cirrus Research plc

DATE OF ISSUE  
19 January 2024

CERTIFICATE NUMBER  
206877



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

Page 1 of 2

Approved signatory  
N.Smith  
Electronically signed:  


Dosemeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer:  
Model:  
Serial number:  
Firmware version:

Cirrus Research plc  
CR:110A  
CB1498  
5.4

Notes:  
Eastern Thai Consulting 1992 Co.,Ltd.  
663 Moo 11, Sukaphibai 8 Rd., Nongkham,  
Siracha, Chonburi 20230

**Test summary**

Date of calibration: 19 January 2024

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

**Test equipment**

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001553
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	100498

**Notes**

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

CERTIFICATE OF CALIBRATION

Certificate Number:  
206877

Page 2 of 2

**Environmental conditions**

The following conditions were recorded at the time of the test:

<b>Before</b>	Pressure: 100.96 kPa	Temperature: 21.6 °C	Humidity: 33.2 %
<b>After</b>	Pressure: 100.97 kPa	Temperature: 21.5 °C	Humidity: 33.4 %

**Test results summary**

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

copy

copy

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CA8879**

CERTIFICATE OF CALIBRATION

ISSUED BY

Cirrus Research plc

DATE OF ISSUE

19 January 2024

CERTIFICATE NUMBER

206901

Cirrus Research plc

Acoustic House

Bridlington Road

Hummanby

North Yorkshire

YO14 0PH

United Kingdom

Page 1 of 2

Approved signatory

N. Smith

Electronically signed:



Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer:

Cirrus Research plc

Model:

CR.110A

Serial number:

CA8879

Firmware version:

5.4

Notes:

Eastern Thai Consulting 1992 Co.,Ltd.  
683 Moo.11, Sukapitbai 8 Rd., Nongkhnam,  
Siracha, Chonburi 20230

Test summary

Date of calibration:

19 January 2024

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG-1032X	SDG1XDDQ6R6309
Attenuator	Cirrus Research	ZE-952	93892
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC-110A	40088

Notes

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

CERTIFICATE OF CALIBRATION

Certificate Number:

206901

Page

2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before

Pressure: 100.92 kPa

Temperature: 21.6 °C

Humidity: 35.3 %

After

Pressure: 100.93 kPa

Temperature: 21.7 °C

Humidity: 40.1 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

COPY

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CA8886**

Dosimeter : IEC 61252-1993+A1:2000

Instrument information		
Manufacturer:	Cirrus Research plc	Notes: Eastern Thai Consulting 1992 Co.,Ltd. 883 Moo.11, Sukaphibai 8 Rd., Nongkham, Sriacha, Chonburi 20230
Model:	CR-110A	
Serial number:	CA8886	
Firmware version:	5.4	

**Test summary**

Date of calibration: 19 January 2024

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment			
Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG 1032X	SDG1XDDQ6R6309
Attenuator	Cirrus Research	ZE-952	93892
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC-110A	40088

**Notes**

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

**Environmental conditions**

The following conditions were recorded at the time of the test:

Before	Pressure: 100.96 kPa	Temperature: 21.5 °C	Humidity: 35.2 %
After	Pressure: 100.96 kPa	Temperature: 21.6 °C	Humidity: 33.4 %

**Test results summary**

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

COPY

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB0954**

CERTIFICATE OF CALIBRATION

ISSUED BY  
Cirrus Research plc

DATE OF ISSUE  
19 January 2024

CERTIFICATE NUMBER  
206864



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

Page 1 of 2

Approved signatory  
N Smith  
Electronically signed:

Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer:  
Model:  
Serial number:  
Firmware version:

Cirrus Research plc  
CR-110A  
CB0954  
5.4

Notes:  
Eastern Thai Consulting 1992 Co.,Ltd.  
683 Moo.11, Sukaphibai 8 Rd., Nongkham,  
Sitracha, Chonburi 20230

Test summary

Date of calibration:  
19 January 2024

The calibration was performed respecting the requirements of ISO/IEC 17025:2017  
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001553
Attenuator	Cirrus Research	ZE-952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC-110A	100498

Notes

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

CERTIFICATE OF CALIBRATION

Certificate Number:  
206864

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before  
After

Pressure:  
Pressure:

100.03 kPa  
100.06 kPa

Temperature:  
Temperature:

21.9 °C  
21.7 °C

Humidity:  
Humidity:

34.8 %  
36.8 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

COPY

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB0958**

CERTIFICATE OF CALIBRATION

ISSUED BY

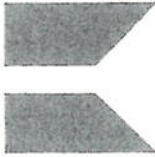
Cirrus Research plc

DATE OF ISSUE

19 January 2024

CERTIFICATE NUMBER

206885



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

Page 1 of 2

Approved signatory

N Smith

Electronically signed

Dosemeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc  
Model: CR-110A  
Serial number: CB0958  
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co.,Ltd.  
683 Moo.11, Sukaphibal 8 Rd., Nongkham,  
Sriracha, Chonburi 20230

Test summary

Date of calibration: 19 January 2024  
The calibration was performed respecting the requirements of ISO/IEC 17025:2017.  
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.  
The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001553
Attenuator	Cirrus Research	ZE-952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC-110A	100498

Notes

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

CERTIFICATE OF CALIBRATION

Certificate Number:

206885

Page

2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 100.06 kPa Temperature: 21.8 °C Humidity: 35.6 %  
After Pressure: 100.10 kPa Temperature: 21.9 °C Humidity: 37.4 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

COPY

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB0957**

CERTIFICATE OF CALIBRATION

ISSUED BY

Cirrus Research plc

DATE OF ISSUE

19 January 2024

CERTIFICATE NUMBER

206874



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

Page 1 of 2

Approved signatory

N. Smith

Electronically signed:

Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer:

Cirrus Research plc

Model:

CR:110A

Serial number:

CB0957

Firmware version:

5.4

Notes:

Eastern Thai Consulting 1992 Co., Ltd.  
683 Moo. 11, Sukaphibai 8 Rd., Nongkham,  
Sriracha, Chonburi 20230

Test summary

Date of calibration:

19 January 2024

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001553
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	100498

Notes

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

CERTIFICATE OF CALIBRATION

Certificate Number:

206874

Page

2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before

Pressure: 100.86 kPa

Temperature: 20.9 °C

Humidity: 28.6 %

After

Pressure: 100.89 kPa

Temperature: 20.7 °C

Humidity: 29.0 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

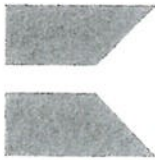
COPY

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB0955**



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

Page 1 of 2

Approved signatory  
N Smith  
Electronically signed:

Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer:

Cirrus Research plc

Model:

CR:110A

Serial number:

CB0955

Firmware version:

5.4

Notes:

Eastern Thai Consulting 1992 Co.,Ltd.  
683 Moo.11, Sukaphibai 8 Rd., Nongkham,  
Siracha, Chonburi 20230

Test summary

Date of calibration:

19 January 2024

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDQ6R6309
Attenuator	Cirrus Research	ZE:952	93892
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	40088

Notes

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

Environmental conditions

The following conditions were recorded at the time of the test:

Before

Pressure:

100.95 kPa

Temperature:

21,5 °C

Humidity:

35.2 %

After

Pressure:

100.93 kPa

Temperature:

21,7 °C

Humidity:

35.7 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

COPY

COPY

**NOISE DOSI METER**

**MODEL : CR:110A**

**SERIAL No. : CB0956**

CERTIFICATE OF CALIBRATION

ISSUED BY

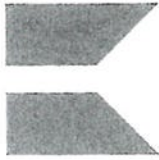
Cirrus Research plc

DATE OF ISSUE

19 January 2024

CERTIFICATE NUMBER

206875



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

Page 1 of 2

Approved signatory

N Smith

Electronically signed:

Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer:

Cirrus Research plc

Model:

CR:110A

Serial number:

CB0956

Firmware version:

5.4

Notes:

Eastern Thai Consulting 1992 Co., Ltd.  
683 Moo. 11, Sukaphibai 8 Rd., Nongkham,  
Sriacha, Chonburi 20230

Test summary

Date of calibration:

19 January 2024

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDQ6R6309
Attenuator	Cirrus Research	ZE:952	93892
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	40088

Notes

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

CERTIFICATE OF CALIBRATION

Certificate Number:

206875

Page

2 of 2

Environmental conditions

The following conditions were recorded at the time of the test.

Before

Pressure: 100.92 kPa

Temperature: 21.7 °C

Humidity: 36.0 %

After

Pressure: 100.93 kPa

Temperature: 21.5 °C

Humidity: 35.9 %

Test results summary

Test	Result
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies
Absolute Acoustic Sensitivity	Complies

COPY

COPY

**Area Heat Stress Monitor**

**Model : QUESTemp 34**

**Serial No. : TEU080012**



CALIBRATION CERTIFICATE

Certificate No. : L202306315-002  
Date Issued : 04-Jul-23

Customer : Eastern Thai Consulting 1992 Co., Ltd.  
683 Moo 11 Sukhapibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Area Heat Stress Monitor

Manufacturer : TSI  
Model : QUESTemp 34  
Serial No. : TEU080012  
ID No./Tag No. : NO.11  
Date Received : 30-Jun-23  
Date Calibrated : 02-Jul-23

Calibrated by : Mr. Apiwat Peanrungrat

Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level confidence approximately 95 percent.

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

Approved by: *Sorayuth*  
( Mr. Sarayuth Tochua )



COPY

Certificate No. : L202306315-002

Environment : Ambient Temperature :  $(25 \pm 2) ^\circ\text{C}$   
Relative Humidity :  $(50 \pm 15)\%\text{RH}$

STD Reading ( $^\circ\text{C}$ )	UUC Reading ( $^\circ\text{C}$ )		UUC Error ( $^\circ\text{C}$ )	Measurement Uncertainty ( $\pm ^\circ\text{C}$ )
	Before Adjusted	After Adjusted		
37.99	WET 37.9	-	-0.09	0.35
37.99	DRY 37.9	-	-0.09	0.35
37.99	GLOBE 37.9	-	-0.09	0.35
45.01	WET 45.3	-	0.29	0.35
45.01	DRY 45.2	-	0.19	0.35
45.01	GLOBE 45.1	-	0.09	0.35

STD = Standard

UUC = Unit Under Calibration

Description of UUC : Range 0 to 100  $^\circ\text{C}$   
Resolution 0.1  $^\circ\text{C}$

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. L202210258-006 for Digital Thermometer with Probe (Fluke) Serial No. 5856603, Due 10-Nov-23

End of Certificate

COPY

**Area Heat Stress Monitor**

**Model : QUESTemp 32**

**Serial No. : TPQ030023**



## CALIBRATION CERTIFICATE

Certificate No. : L202401128-0003  
 Date Issued : 22-Jan-24

**Customer** : Eastern Thai Consulting 1992 Co., Ltd.  
 683 Moo 11 Sukhaphibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

**Equipment** : Area Heat Stress Monitor

**Manufacturer** : QUEST TECHNOLOGY

**Model** : QUESTEMP 32

**Serial No.** : TPQ030023

**ID No./Tag No.** : NO.8

**Date Received** : 17-Jan-24

**Date Calibrated** : 18-Jan-24

**Calibrated by** : Mr. Apiwat Peanrungrat

### Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

### Result of Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level confidence approximately 95 percent.

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



Page 1 of 2

Approved by: **Sorayuth T.**  
 ( Mr. Sarayuth Tochua )

**COPY**

**COPY**

Certificate No. : L202401128-0003

Environment : Ambient Temperature :  $(25 \pm 2) ^\circ\text{C}$

Relative Humidity :  $(50 \pm 15)\%\text{RH}$

STD Reading ( $^\circ\text{C}$ )	Before Adjusted	After Adjusted	UUC Error ( $^\circ\text{C}$ )	Measurement Uncertainty ( $\pm ^\circ\text{C}$ )	MPE ( $\pm ^\circ\text{C}$ )	Pass / Fail with Guard Band
38.01	WET 38.0	-	-0.01	0.35	1	Pass
38.01	DRY 38.1	-	0.09	0.35	1	Pass
38.01	GLOBE 38.0	-	-0.01	0.35	1	Pass
45.01	WET 44.8	-	-0.21	0.35	1	Pass
45.01	DRY 45.0	-	-0.01	0.35	1	Pass
45.01	GLOBE 44.8	-	-0.21	0.35	1	Pass

STD = Standard

Pass =  $|\text{error}| + |\text{uncertainty}| \leq |\text{MPE}|$

UUC = Unit Under Calibration

Fail =  $|\text{error}| + |\text{uncertainty}| > |\text{MPE}|$

Description of UUC :

Range  $(-5) \text{ to } 100 ^\circ\text{C}$

Resolution

0.1  $^\circ\text{C}$

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. L202310317-0003 for Digital Thermometer with Probe (Fluke) Serial No. 5856603, Due 06-Nov-24

End of Certificate

Page 2 of 2

**Area Heat Stress Monitor**

**Model : QUESTemp 34**

**Serial No. : TEU080015**



## CALIBRATION CERTIFICATE

Certificate No. : L202307241-0001  
 Date Issued : 24-Jul-23

**Customer** : Eastern Thai Consulting 1992 Co., Ltd.  
 683 Moo 11 Sukhapibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

**Equipment** : Area Heat Stress Monitor

**Manufacturer** : QUEST TECHNOLOGY

**Model** : QUESTEMP 34

**Serial No.** : TEU080015

**ID No./Tag No.** : No.14

**Date Received** : 21-Jul-23

**Date Calibrated** : 22-Jul-23

**Calibrated by** : Mr. Apiwat Peannungrot

### Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

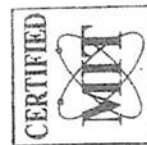
This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

### Result of Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level confidence approximately 95 percent.

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

Approved by: **Saranyuth T.**  
 (Mr. Sarayuth Tochua)



Page 1 of 2

**COPY**

Certificate No. : L202307241-0001

Environment : Ambient Temperature :  $(25 \pm 2) ^\circ\text{C}$

Relative Humidity :  $(50 \pm 15)\%\text{RH}$

STD	Reading ( $^\circ\text{C}$ )	UUC Reading ( $^\circ\text{C}$ )		UUC Error ( $^\circ\text{C}$ )	Measurement Uncertainty ( $\pm ^\circ\text{C}$ )
		Before Adjusted	After Adjusted		
38.00	WET	38.0	-	0.00	0.35
38.00	DRY	38.1	-	0.10	0.35
38.00	GLOBE	37.9	-	-0.10	0.35
44.99	WET	44.7	-	-0.29	0.35
44.99	DRY	44.8	-	-0.19	0.35
44.99	GLOBE	44.6	-	-0.39	0.35

STD = Standard

UUC = Unit Under Calibration

Description of UUC : Range 0 to 100  $^\circ\text{C}$   
 Resolution 0.1  $^\circ\text{C}$

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. L202210258-006 for Digital Thermometer with Probe (Fluke) Serial No. 5856603, Due 10-Nov-23

End of Certificate

Page 2 of 2

**COPY**

**Area Heat Stress Monitor**

**Model : QUESTemp 32**

**Serial No. : TPL090017**



## CALIBRATION CERTIFICATE

Certificate No. : L202401128-0001  
 Date Issued : 22-Jan-24

**Customer** : Eastern Thai Consulting 1992 Co., Ltd.  
 683 Moo 11 Sukhapiarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

**Equipment** : Area Heat Stress Monitor  
**Manufacturer** : QUEST TECHNOLOGY  
**Model** : QUESTEMP 32  
**Serial No.** : TPL090017  
**ID No./Tag No.** : NO.7  
**Date Received** : 17-Jan-24  
**Date Calibrated** : 18-Jan-24  
**Calibrated by** : Mr. Apiwat Peanrungrat

Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

### Result of Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level confidence approximately 95 percent.

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



Approved by: *Sorayuth*  
 ( Mr. Sarayuth Tochua )

Page 1 of 2

**COPY**

Certificate No. : L202401128-0001

Environment : Ambient Temperature

(25 ± 2) °C

Relative Humidity :

(50 ± 15)%RH

STD	Reading (°C)	Before Adjusted	After Adjusted	UUC Reading (°C)	UUC Error (°C)	Measurement Uncertainty (±°C)	MPE (±°C)	Pass / Fail with Guard Band
38.01	WET	38.0	-	-	-0.01	0.35	1	Pass
38.01	DRY	37.6	-	-	-0.41	0.35	1	Pass
38.01	GLOBE	38.1	-	-	0.09	0.35	1	Pass
45.01	WET	45.0	-	-	-0.01	0.35	1	Pass
45.01	DRY	44.6	-	-	-0.41	0.35	1	Pass
45.01	GLOBE	45.1	-	-	0.09	0.35	1	Pass

STD = Standard

Pass = |error| + |uncertainty| ≤ |MPE|

UUC = Unit Under Calibration

Fail = |error| + |uncertainty| > |MPE|

Description of UUC :

Range

(-5) to 100 °C

Resolution

0.1 °C

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. L202310317-0003 for Digital Thermometer with Probe (Fluke) Serial No. 5856603, Due 06-Nov-24

End of Certificate

Page 2 of 2

**COPY**

**Area Heat Stress Monitor**

**Model : QUESTemp 34**

**Serial No. : TEU080014**



## CALIBRATION CERTIFICATE

**Certificate No. :** L202307241-0002  
**Date Issued :** 24-Jul-23

**Customer** : Eastern Thai Consulting 1992 Co., Ltd.  
 683 Moo 11 Sukhapibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

**Equipment** : Area Heat Stress Monitor

**Manufacturer** : QUEST TECHNOLOGY

**Model** : QUESTEMP 34

**Serial No.** : TEU080014

**ID No./Tag No.** : No.13

**Date Received** : 21-Jul-23

**Date Calibrated** : 22-Jul-23

**Calibrated by** : Mr. Apiwat Peanrungrat

### Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

### Result of Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level confidence approximately 95 percent.

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

Approved by: *Saranyuth*  
 (Mr. Sarayuth Tochua)



Page 1 of 2

**COPY**

**Certificate No. :** L202307241-0002  
**Environment :** Ambient Temperature : (25 ± 2) °C  
 Relative Humidity : (50 ± 15)%RH

STD	Reading (°C)	Before Adjusted	After Adjusted	UUC Error (°C)	Measurement Uncertainty (±°C)
38.00	WET	38.1	-	0.10	0.35
38.00	DRY	38.2	-	0.20	0.35
38.00	GLOBE	38.0	-	0.00	0.35
44.99	WET	45.0	-	0.01	0.35
44.99	DRY	45.1	-	0.11	0.35
44.99	GLOBE	44.9	-	-0.09	0.35

STD = Standard

UUC = Unit Under Calibration

**Description of UUC :**  
 Range 0 to 100 °C  
 Resolution 0.1 °C

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

**Measurement Standards Used & Traceability :**

The International System of Units (SI) through

MIT Certificate No. L202210258-006 for Digital Thermometer with Probe (Fluke) Serial No. 5855603, Due 10-Nov-23

End of Certificate

Page 2 of 2

**COPY**

**Area Heat Stress Monitor**

**Model : QUESTemp 32**

**Serial No. : TPL090016**



## CALIBRATION CERTIFICATE

Certificate No. : L202308070-0001  
 Date Issued : 05-Sep-23

**Customer** : Eastern Thai Consulting 1992 Co., Ltd.  
 683 Moo 11 Sukhapiarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

**Equipment** : Area Heat Stress Monitor

**Manufacturer** : QUEST TECHNOLOGY

**Model** : QUESTEMP 32

**Serial No.** : TPL090016

**ID No./Tag No.** : No.6

**Date Received** : 01-Sep-23

**Date Calibrated** : 04-Sep-23

**Calibrated by** : Mr. Apiwat Peanrungrat

### Calibration Method or Calibration Procedure Used

In-house method : CP-19 by comparing against Standard Digital Humidity / Temperature Meter

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

### Result of Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level confidence approximately 95 percent.

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

Approved by: *Saranyuth T.*  
 ( Mr. Sarayuth Tochua )



Page 1 of 2

**COPY**

Certificate No. : L202308070-0001  
 Environment : Ambient Temperature :  $(25 \pm 2) ^\circ\text{C}$   
 Relative Humidity :  $(50 \pm 15)\%\text{RH}$

STD Reading ( $^\circ\text{C}$ )	UUC Reading ( $^\circ\text{C}$ )	Before Adjusted	After Adjusted	UUC Error ( $^\circ\text{C}$ )	Measurement Uncertainty ( $\pm^\circ\text{C}$ )
37.99	WET	38.1	-	0.11	0.35
37.99	DRY	37.9	-	-0.09	0.35
37.99	GLOBE	38.1	-	0.11	0.35
45.01	WET	45.1	-	0.09	0.35
45.01	DRY	44.9	-	-0.11	0.35
45.01	GLOBE	45.1	-	0.09	0.35

STD = Standard

UUC = Unit Under Calibration

Description of UUC : Range 0 to 100  $^\circ\text{C}$   
 Resolution 0.1  $^\circ\text{C}$

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. L202210258-006 for Digital Thermometer with Probe (Fluke) Serial No. 5856603, Due 10-Nov-23

End of Certificate

Page 2 of 2

**COPY**

ภาคผนวก ง : หนังสืออนุญาตขึ้นทะเบียน  
ห้องปฏิบัติการวิเคราะห์เอกชน



ที่ อก ๐๓๒๐/๑๑๓๔๒

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๗ กรกฎาคม ๒๕๖๖

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด

อ้างถึง คำขอต่ออายุของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๗ มิถุนายน ๒๕๖๖

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๔๐ ราย
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒๕ ราย
๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๙๒ รายการ  
จำนวน ๑๙ แผ่น

ตามหนังสือที่อ้างถึง บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๐๐๓ สถานที่ตั้งเลขที่ ๖๘๓ หมู่ที่ ๑๑ ถนนสุขาภิบาล ๘ ตำบลหนองขาม อำเภอศรีราชา จังหวัดชลบุรี ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

- ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๔๐ ราย ตามสิ่งที่ส่งมาด้วย ๑
- ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒๕ ราย ตามสิ่งที่ส่งมาด้วย ๒
- ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๔๗ รายการ  
อากาศเสีย (ปล่องระบาย) จำนวน ๒๑ รายการ น้ำใต้ดิน จำนวน ๑๑ รายการ สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว  
จำนวน ๑๘ รายการ และดิน จำนวน ๙ รายการ รวมทั้งสิ้นจำนวน ๒๙๒ รายการ ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๕ กรกฎาคม ๒๕๖๙ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายทวี อำพาพันธ์)

ผู้อำนวยการศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก  
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

โทร. ๐ ๓๓๑๓ ๖๐๕๕ ต่อ ๕๐๐๑-๒

ไปรษณีย์อิเล็กทรอนิกส์ [eirw@diw.mail.go.th](mailto:eirw@diw.mail.go.th)



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท อีสเทิร์น ไทย คอนซัลติง ๑๙๙๒ จำกัด เลขทะเบียน ว-๐๐๓

ที่ อก ๐๓๒๐/๑๑๓๔๒

ลงวันที่ ๒๗ กรกฎาคม ๒๕๖๖

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๔๐ ราย

๑) นางสาวมาลีเกษ เลขะวัจกุล	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๐๑
๒) นายวัฒนา โคตรหล้า	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๐๒
๓) นางวรรณเพ็ญ เหลาจินดาว์ฒน์	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๐๓
๔) นายกะวีร์ สุธาทรัพย์	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๐๔
๕) นางสาวนันท์ณภัส แบนขุนทด	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๐๕
๖) นางสาวพรนภา หลงคำหงษ์	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๐๖
๗) นางสาวอภิรดี ชื่นอารมย์	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๐๗
๘) นางสาวอัจฉรี จิตตะยโสธร	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๐๘
๙) นางสาวจิรพร ปานคง	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๐๙
๑๐) นายสุทธา สองธนิย์	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๑๐
๑๑) นางสาวนันท์ประภา อู๋สูงเนิน	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๑๑
๑๒) นายธงไชย บุญศักดิ์	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๑๒
๑๓) นางสาวธนิชพร กลิ่นโสภณ	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๑๓
๑๔) นายธีระพงษ์ นวลอินทร์	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๑๔
๑๕) นางสาวแพรว พลเสน	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๑๕
๑๖) นายทรงพล ผิวอ้วน	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๑๖
๑๗) นายภาคภูมิ บัวสวัสดิ์	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๑๗
๑๘) นางสาวจันทน์ สายพันธ์	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๑๘
๑๙) นายภาณุพงศ์ บำรุงรส	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๑๙
๒๐) นางสาวภาณิน จันดีสอน	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๒๐
๒๑) นายวรกร ไวทยะเสวี	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๒๑
๒๒) นางสาววรรณภา ไชยศิริ	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๒๒
๒๓) นางสาวพรพิมล ภูมิคอนสาร	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๒๓
๒๔) นางสาวธมลวรรณ ผลอ้อ	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๒๔
๒๕) นางสาวบุญเรือง บุญถม	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๒๕
๒๖) นางสาวภัสนันท์ ป้อมน้อย	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๒๖
๒๗) นายชานวัฒน์ โชตะวงศ์	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๒๗
๒๘) นางสาวพจณีย์ งามวิสัย	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๒๘
๒๙) นายวิญญ์วัช สิงห์โต	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๒๙
๓๐) นางสาวนุกูล อามรศรี	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๓๐
๓๑) นายศุภฤกษ์ พาดกลาง	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๓๑
๓๒) นายณิขพล ทองหล่อ	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๓๒
๓๓) นายธรรมรัตน์ โพธิ์ตันคำ	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๓๓
๓๔) นายโอชา ขวัญศิริมงคล	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๓๔
๓๕) นายเมธี สุขประเสริฐ	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๓๕

๓๖) นางสาวพรพินันท์...

๓๖) นางสาวพรพินันท์ วิริยกุลกุล	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๓๖
๓๗) นางสาวอาภาภรณ์ เสริมสนธิ	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๓๗
๓๘) นางสาวนภัทร์ธมณต์ ประดิษฐ์นุช	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๓๘
๓๙) นางสาวสุนิษา เอ็งเส้ง	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๓๙
๔๐) นางสาวระพีณ อินัน	ทะเบียนเลขที่	ว-๐๐๓-ค-๐๐๔๐

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒๕ ราย

๑) นางสาวดวงกมล เนื้อทอง	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๐๑
๒) นางสาววัชรภรณ์ อินทสุข	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๐๒
๓) นางสาวกัญจน์ธวิกา จันทร์ขอดแก้ว	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๐๓
๔) นางสาวฉัตรสุดา มงคลโกชน	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๐๔
๕) นางสาวณัฐวดี อำมาตย์ศน์	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๐๕
๖) นางสาวนอรอุมา ปาระ	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๐๖
๗) นางสาวธัญลักษณ์ ชันโต	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๐๗
๘) นางสาวสุทธิดา สร้างแก้ว	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๐๘
๙) นายอุดมทรัพย์ เจนจบจริง	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๐๙
๑๐) นายนราธิป สงวนศิลป์	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๑๐
๑๑) นายวีระชัย พอใจ	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๑๑
๑๒) นายอัญชลี ทะพงษ์	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๑๒
๑๓) นางสาวสมิตตรา มีแก่น	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๑๓
๑๔) นางสาวสวรรยา เพชรประไพ	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๑๔
๑๕) นางสาวจุฑามาศ เจริญพรหม	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๑๕
๑๖) นางสาวนิภาพร คำชมภู	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๑๖
๑๗) นางสาวอรชา พันธุ์เมือง	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๑๗
๑๘) นายกิตติ ไพโรจน์	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๑๘
๑๙) นายชาญณรงค์ ตั้งธรรมรักษ์	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๑๙
๒๐) นางสาวปวีศา เอสันเทียะ	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๒๐
๒๑) นางสาวจุฑาทิพย์ กิจดี	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๒๑
๒๒) นางสาวสุภาวดี ศรีละออง	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๒๒
๒๓) นางสาวณัฐชยา บรรพบุตร	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๒๓
๒๔) นางสาวณัฐนิช นนตานอก	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๒๔
๒๕) นางสาวดวงสุดา แสนวันดี	ทะเบียนเลขที่	ว-๐๐๓-จ-๐๐๒๕

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท อีสเทิร์น ไทย คอนซัลติ้ง ๑๙๙๒ จำกัด เลขทะเบียน ว-๐๐๓

ที่ ออก ๐๓๒๐/๑๑๓๔๒

ลงวันที่ ๒๗ กรกฎาคม ๒๕๖๖

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๙๒ รายการ

น้ำเสีย จำนวน 47 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
2	Arsenic	1) Continuous Hydride Generation/Atomic Absorption Spectrometric Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
3	Barium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
4	$\alpha$ -BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
5	$\beta$ -BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
6	$\delta$ -BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
7	$\gamma$ -BHC	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
8	Biochemical Oxygen Demand	1) 5-Day BOD Test, Membrane Electrode Method <sup>[4]</sup> 2) 5-Day BOD Test, Azide Modification Method <sup>[4]</sup>
9	Cadmium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
10	Chemical Oxygen Demand	Closed Reflux, Titrimetric Method <sup>[4]</sup>
11	cis-Chlordane	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
12	trans-Chlordane	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
13	Chromium	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
14	Color	ADMI Weighted-Ordinate Spectrophotometric Method <sup>[4]</sup>
15	Copper	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
16	Cyanide	Distillation, Colorimetric Method <sup>[4]</sup>
17	4,4'-DDD	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
18	4,4'-DDE	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
19	DDT	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
20	Dieldrin	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
21	Endosulfan I	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
22	Endosulfan II	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
23	Endosulfan sulfate	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
24	Endrin	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
25	Endrin aldehyde	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
26	Endrin ketone	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
27	Formaldehyde	Distillation, Colorimetric Method <sup>[3]</sup>
28	Free Chlorine	1) Iodometric Method <sup>[4]</sup> 2) Colorimetric Method <sup>[4]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
29	Heptachlor	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
30	Heptachlor Epoxide	1) Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
31	Hexavalent Chromium	Filtration, Colorimetric Method <sup>[4]</sup>
32	Lead	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
33	Manganese	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
34	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[4]</sup>
35	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[4]</sup>
36	Nickel	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
37	Oil and Grease	Liquid-Liquid, Partition-Gravimetric Method <sup>[4]</sup>
38	pH	Electrometric Method <sup>[4]</sup>
39	Phenols	Distillation, Direct Photometric Method <sup>[4]</sup>
40	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[4]</sup>
41	Sulfide	ZnS Precipitation, Iodometric Method <sup>[4]</sup>
42	Temperature	Field Method <sup>[4]</sup>
43	Trivalent Chromium	1) Digestion, Direct Air-Acetylene Flame Method; Filtration, Colorimetric Method; Calculation <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation <sup>[4]</sup>
44	Total Dissolved Solids	Dried at 180 °C <sup>[4]</sup>
45	Total Kjeldahl Nitrogen	Macro Kjeldahl Method <sup>[4]</sup>
46	Total Suspended Solids	Dried at 103-105 °C <sup>[4]</sup>
47	Zinc	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>

**อากาศเสีย (ปล่อยระบาย) จำนวน 21 รายการ**

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
2	Arsenic	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
3	Cadmium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
4	Carbon Monoxide	1) Bag, Non-Dispersive Infrared Method <sup>[5]</sup> 2) Instrumental Analyzer Method <sup>[5]</sup>
5	Chromium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
6	Cobalt	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
7	Copper	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
8	Hydrogen Sulfide	Absorption Sampling, Iodometric Method <sup>[5]</sup>
9	Lead	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
10	Manganese	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
11	Mercury	Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[5]</sup>
12	Nickel	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
13	Opacity	Ringelmann's Method <sup>[1,5]</sup>
14	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method <sup>[8]</sup> 2) Instrumental Analyzer Method <sup>[7]</sup>
15	Selenium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
16	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method <sup>[5]</sup> 2) Instrumental Analyzer Method <sup>[5]</sup>
17	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method <sup>[6]</sup>
18	Tin	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method <sup>[6]</sup>
20	Vanadium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>[5]</sup>
21	Xylene	Adsorption Sampling, Gas Chromatographic Method <sup>[6]</sup>

**น้ำใต้ดิน จำนวน 111 รายการ**

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
5	Antimony	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
6	Arsenic	1) Continuous Hydride Generation/Atomic Absorption Spectrometric Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
7	Barium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
8	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
9	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
10	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
11	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
12	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
13	Benzo[g,h,i]perylene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
14	Beryllium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
16	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
17	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
18	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
19	Butanol	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
20	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
21	Cadmium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
22	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
23	Carbon disulfide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
24	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
25	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
26	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
27	Chlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
28	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
29	Chloroform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
30	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
31	Chromium	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
32	Chromium (III)	1) Digestion, Direct Air-Acetylene Flame Method; Filtration, Colorimetric Method; Calculation <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method; Filtration, Colorimetric Method; Calculation <sup>[4]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
33	Chromium (VI)	Filtration, Colorimetric Method <sup>[4]</sup>
34	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
35	Cyanide	Distillation, Colorimetric Method <sup>[4]</sup>
36	DDD	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
37	DDE	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
38	DDT	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
39	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
40	Di-n-butyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
41	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
42	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
43	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
44	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
45	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
46	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
47	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
48	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
49	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
50	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
51	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
52	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
53	Diethyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
54	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
55	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
56	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
57	Di-n-octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
58	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
59	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
60	Ethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
61	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
62	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
63	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
64	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
65	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
66	Hexachloro-1,3-butadiene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
67	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
68	$\alpha$ -HCH	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
69	$\beta$ -HCH	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
70	$\gamma$ -HCH	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
71	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
72	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
73	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
74	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
75	Lead	1) Digestion, Direct Air-Acetylene Flame Method <sup>[4]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
76	Manganese	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
77	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[4]</sup>
78	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
79	Methylene chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
80	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
81	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
82	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
83	Naphthalene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
84	Nickel	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
85	Nitrobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
86	N-Nitrosodi-n-propylamine	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
87	pH	Electrometric Method <sup>[4]</sup>
88	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
89	Phenol	1) Distillation, Direct Photometric Method <sup>[4]</sup> 2) Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
90	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
91	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[4]</sup>
92	Silver	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
93	Styrene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
94	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
95	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
96	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
97	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
98	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
99	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
100	Toluene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
101	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
102	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
103	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
104	Vanadium	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>
105	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
106	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
107	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
108	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
109	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
110	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[4]</sup>
111	Zinc	Digestion, Inductively Coupled Plasma Method <sup>[4]</sup>

**สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 18 รายการ**

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
2	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,9,10]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
3	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,9,10]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
4	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,9,10]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
5	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,9,10]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
6	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,9,10]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
7	Chromium (VI)	1) Waste Extraction, Digestion, Colorimetric Method <sup>[2,13]</sup> 2) Alkaline Digestion, Colorimetric Method <sup>[9,13]</sup>
8	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,9,10]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
9	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,9,10]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
10	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,9,10]</sup>
11	Mercury	2) Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup> 1) Waste Extraction, Digestion, Cold Vapor Atomic Absorption Spectrometric Method <sup>[2,11]</sup> 2) Digestion, Cold vapor Atomic Absorption Spectrometric Method <sup>[9,11]</sup>
12	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,9,10]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
13	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,9,10]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
14	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,9,10]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
15	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,9,10]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
16	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,9,10]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
17	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,9,10]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
18	Zinc	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[2,9,10]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>

ดิน จำนวน 95 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
3	Anthracene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
4	Antimony	Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
5	Arsenic	Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
6	Barium	Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
7	Benz(a)anthracene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
8	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
9	Benzo(b)fluoranthene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
10	Benzo(k)fluoranthene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
11	Benzo(a)pyrene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
12	Benzo[g,h,i]perylene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
13	Beryllium	Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
14	Bis(2-chloroethyl)ether	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
15	Bis(2-ethylhexyl)phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
16	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
17	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
18	Butanol	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>

19 Butyl benzyl phthalate...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Butyl benzyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
20	Cadmium	Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
21	Carbazole	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
22	Carbon disulfide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
23	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
24	p-Chloroaniline	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
25	Chlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
26	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
27	Chloroform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
28	2-Chlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
29	Chromium	Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
30	Chromium (III)	Digestion, Inductively Coupled Plasma Method; Filtration, Colorimetric Method; Calculation <sup>[9,10]</sup>
31	Chromium (VI)	Alkaline Digestion, Colorimetric Method <sup>[12,13]</sup>
32	Chrysene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
33	Dibenz(a,h)anthracene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
34	Di-n-butyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
35	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
36	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
37	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>

38 1,1-Dichloroethane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
38	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
39	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
40	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
41	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
42	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
43	2,4-Dichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
44	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
45	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
46	Diethyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
47	2,4-Dimethylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
48	2,4-Dinitrotoluene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
49	2,6-Dinitrotoluene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
50	Di-n-octyl phthalate	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
51	Ethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
52	Fluoranthene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
53	Fluorene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
54	Hexachlorobenzene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
55	Hexachloro-1,3-butadiene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
56	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
57	Hexachlorocyclopentadiene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
58	Hexachloroethane	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
59	Indeno(1,2,3-cd)pyrene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
60	Isophorone	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
61	Lead	Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
62	Manganese	Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
63	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[9,11]</sup>
64	Methylene chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
65	2-Methylphenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
66	2-Methylnaphthalene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
67	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
68	Naphthalene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
69	Nickel	Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
70	Nitrobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
71	N-Nitrosodi-n-propylamine	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
72	Phenanthrene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
73	Phenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
74	Pyrene	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
75	Selenium	Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
76	Silver	Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
77	Styrene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
78	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
79	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
80	Toluene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
81	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
82	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
83	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
84	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
85	2,4,5-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
86	2,4,6-Trichlorophenol	Ultrasonic Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>[15,17]</sup>
87	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
88	Vanadium	Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>
89	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
90	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
91	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
92	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
93	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>



ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
94	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[14,16]</sup>
95	Zinc	Digestion, Inductively Coupled Plasma Method <sup>[9,10]</sup>

### เอกสารอ้างอิง

1. กระทรวงอุตสาหกรรม. **ประกาศกระทรวงอุตสาหกรรม พ.ศ.2549** เรื่องกำหนดค่าปริมาณเขม่าควันที่เจือปนในอากาศที่ระบายออกจากปล่องของหม้อน้ำโรงสีข้าวที่ใช้กลบเป็นเชื้อเพลิง. ราชกิจจานุเบกษา. 4 ธันวาคม 2549. เล่มที่ 123 ตอนพิเศษ 125 ง.
2. กระทรวงอุตสาหกรรม. **ประกาศกระทรวงอุตสาหกรรม พ.ศ.2548** เรื่อง การกำจัดสิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว. ราชกิจจานุเบกษา. 25 มกราคม 2549. เล่มที่ 123 ตอนพิเศษ 11ง.
3. สมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย. คู่มือวิเคราะห์น้ำเสีย. พิมพ์ครั้งที่ 4. กรุงเทพฯ: เรือนแก้วการพิมพ์, 2547.
4. APHA, AWWA, WEF. **Standard Methods for the Examination of Water and Wastewater**. 23<sup>rd</sup> ed. Washington, DC : APHA, 2017
5. United States Environmental Protection Agency. **Standard of Performance for New Stationary Sources**. 40 CFR Part 60. Appendix A, 2017.
6. United States Environmental Protection Agency. **Standard of Performance for New Stationary Sources**. 40 CFR Part 60. Appendix A, 2019.
7. United States Environmental Protection Agency. **Standard of Performance for New Stationary Sources**. 40 CFR Part 60. Appendix A, 2020.
8. United States Environmental Protection Agency. **Standard of Performance for New Stationary Sources**. 40 CFR Part 60. Appendix A, 2023.
9. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Acid Digestion of Sediments Sludge and Soils. SW-846 Method 3050B**, 1996.
10. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Inductively Coupled Plasma-Atomic Emission spectrometry. SW-846 Method 6010C**, 2007.
11. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Mercury in Solid or Semisolid Waste (Manual Cold-Vapor Technique). SW-846 Method 7471B**, 2007.
12. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Alkaline digestion for Hexavalent Chromium. SW-846 Method 3060A**, 1996.

13. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Chromium. Hexavalent (Colorimetric). SW-846 Method 7196A**, 1992

14. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples. SW-846 Method 5035A**, 2002

15. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Ultrasonic Extraction. SW-846 Method 3550C**, 2007

16. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS). SW-846 Method 8260D**, 2018

17. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry. SW-846 Method 8270E**, 2018





แบบ กภ.บญ  
นิติบุคคล

กรมสวัสดิการและคุ้มครองแรงงาน

ใบอนุญาต

เป็นผู้ให้บริการตรวจวัดระดับความเข้มข้นของสารเคมีอันตราย  
ในบรรยากาศของสถานที่ทำงาน และสถานที่เก็บรักษาสารเคมีอันตราย

ใบอนุญาตเลขที่ ๐๒๐๑-๐๓-๒๕๖๔-๐๐๐๘

อนุญาตให้ บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด

เลขทะเบียนนิติบุคคล ๐๒๐๕๕๓๕๐๐๔๕๗๘

ตั้งอยู่ เลขที่ ๙๙๙ หมู่ที่ ๑๑ ตำบลหนองขาม อำเภอสรีราชา จังหวัดชลบุรี

เป็นนิติบุคคลผู้ให้บริการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน ตามกฎกระทรวง  
กำหนดมาตรฐานในการบริหาร จัดการ และดำเนินการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อม  
ในการทำงานเกี่ยวกับสารเคมีอันตราย พ.ศ. ๒๕๕๖ ในการเป็นผู้ให้บริการตรวจวัดระดับความเข้มข้น  
ของสารเคมีอันตรายในบรรยากาศของสถานที่ทำงาน และสถานที่เก็บรักษาสารเคมีอันตราย ประกอบกับ  
กฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย อาชีวอนามัย และสภาพแวดล้อม  
ในการทำงาน พ.ศ. ๒๕๖๔ แห่งพระราชบัญญัติความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน  
พ.ศ. ๒๕๕๔ โดยมีบุคลากร จำนวน ๑๖ ราย

ทั้งนี้ ตั้งแต่วันที่ ๒๓ ธันวาคม พ.ศ. ๒๕๖๔ ถึงวันที่ ๒๖ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๒๓ ธันวาคม พ.ศ. ๒๕๖๔

(นายสมพจน์ กวางแก้ว)

ผู้ตรวจราชการกรม ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากรแนบท้ายใบอนุญาต  
เป็นนิติบุคคลผู้ให้บริการตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายในบรรยากาศของสถานที่ทำงาน  
และสถานที่เก็บรักษาสารเคมีอันตราย  
ของบริษัท อีสเทิร์น ไทย คอนซัลต์ติ้ง 1992 จำกัด  
ใบอนุญาตเลขที่ ๐๒๐๑-๐๓-๒๕๖๔-๐๐๐๘

๑. นางวรรณเพ็ญ	เหลาจินดาวัดน์
๒. นางสาวธัชพร	กลั่นโสภณ
๓. นายวัฒนา	โคตรหล้า
๔. นายธงไชย	บุญศักดิ์
๕. นายวิญญ์วุฒิ	สิงโต
๖. นายโอชา	ขวัญศิริมงคล
๗. นายธีระพงษ์	นวลอินทร์
๘. นายวรสาร	ไวยยะเสวี
๙. นายณิชาพล	ทองหล่อ
๑๐. นายสุทธา	สองธินันย์
๑๑. นายธรรมรัตน์	โพธิ์ตันคำ
๑๒. นายเมธี	สุขประเสริฐ
๑๓. นายคมกฤษ	ครรรธสอน
๑๔. นายนราธิป	สงวนศิลป์
๑๕. นายวีระชัย	พอใจ
๑๖. นางสาวจริยา	ยาตรี

ทั้งนี้ ตั้งแต่วันที่ ๒๗ ธันวาคม พ.ศ. ๒๕๖๔ ถึงวันที่ ๒๖ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๒๗ ธันวาคม พ.ศ. ๒๕๖๔

(นายสมพนธ์ กวางแก้ว)

ผู้ตรวจราชการกรม ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากร (เพิ่มเติม)  
แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายในบรรยากาศ  
ของสถานที่ทำงานและสถานที่เก็บรักษาสารเคมีอันตราย  
ของบริษัท อีสเทิร์น ไทย คอนซัลติง 1992 จำกัด  
ใบอนุญาตเลขที่ ๐๒๐๑-๐๓-๒๕๖๔-๐๐๐๘

๑. นางสาวนันทประภา	อู๋สูงเนิน
๒. นางสาวจันทนี	สายพันธ์
๓. นายทรงพล	ผิวอ้วน
๔. นายศุภฤกษ์	พาดกลาง
๕. นางสาวอรรวรรณ	นิยม
๖. นางสาววินิดา	จำปาดัน
๗. นางสาวพรนภา	พงษ์เพชร
๘. นางสาวจุฑารัตน์	สุขซาเกต
๙. นางสาวศวิตา	กิตติเนาวรัตน์

ทั้งนี้ ตั้งแต่วันที่ ๒๗ กุมภาพันธ์ พ.ศ. ๒๕๖๖ ถึงวันที่ ๒๖ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๒๗ กุมภาพันธ์ พ.ศ. ๒๕๖๖



(นายสมพจน์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากร (เพิ่มเติม)  
แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายในบรรยากาศ  
ของสถานที่ทำงานและสถานที่เก็บรักษาสารเคมีอันตราย  
ของบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด  
ใบอนุญาตเลขที่ ๐๒๐๑-๐๓-๒๕๖๔-๐๐๐๘

- |                      |              |
|----------------------|--------------|
| ๑. นางสาวอรอนงค์     | สิวงค์ศักดิ์ |
| ๒. นางสาวไพบรียาภรณ์ | สังข์ทอง     |
| ๓. นางสาวยลดา        | พาลี         |
| ๔. นางสาวปภาดา       | เจริญพร      |
| ๕. นายวรารุธ         | อารีย์เอื้อ  |
| ๖. นายศุภกร          | นพพรพิทักษ์  |

ทั้งนี้ ตั้งแต่วันที่ ๑๙ กันยายน พ.ศ. ๒๕๖๖ ถึงวันที่ ๒๖ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๑๙ กันยายน พ.ศ. ๒๕๖๖



(นายสมพจน์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน

อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน



แบบ กภ.บุญ

นิติบุคคล

กรมสวัสดิการและคุ้มครองแรงงาน

ใบอนุญาต

เป็นผู้ให้บริการวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตราย  
ในบรรยากาศของสถานที่ทำงาน และสถานที่เก็บรักษาสารเคมีอันตราย

ใบอนุญาตเลขที่ ๐๒๐๒-๐๓-๒๕๖๔-๐๐๐๕

อนุญาตให้.....บริษัท อีสเทิร์น ไทย คอนซัลติง 1992 จำกัด.....

เลขทะเบียนนิติบุคคล.....๐๒๐๕๕๓๕๐๐๔๕๗๘.....

ตั้งอยู่ เลขที่ ๙๙๙ หมู่ที่ ๑๑ ตำบลหนองขาม อำเภอสรีราชา จังหวัดชลบุรี.....

เป็นนิติบุคคลผู้ให้บริการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน ตามกฎกระทรวง  
กำหนดมาตรฐานในการบริหาร จัดการ และดำเนินการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อม  
ในการทำงานเกี่ยวกับสารเคมีอันตราย พ.ศ. ๒๕๕๖ ในการเป็นผู้ให้บริการวิเคราะห์ระดับความเข้มข้น  
ของสารเคมีอันตรายในบรรยากาศของสถานที่ทำงาน และสถานที่เก็บรักษาสารเคมีอันตราย ประกอบกับ  
กฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย อาชีวอนามัย และสภาพแวดล้อม  
ในการทำงาน พ.ศ. ๒๕๖๔ แห่งพระราชบัญญัติความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน  
พ.ศ. ๒๕๕๔ โดยมีบุคลากร จำนวน ๙ ราย

ทั้งนี้ ตั้งแต่วันที่ ๒๗ ธันวาคม พ.ศ. ๒๕๖๔ ถึงวันที่ ๒๖ ธันวาคม พ.ศ. ๒๕๖๕

ให้ไว้ ณ วันที่ ๒๗ ธันวาคม พ.ศ. ๒๕๖๔

(นายสมพจน์ กวางแก้ว)

ผู้ตรวจราชการกรม ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากรแนบท้ายใบอนุญาต  
เป็นนิติบุคคลผู้ให้บริการวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายในบรรยากาศของสถานที่ทำงาน  
และสถานที่เก็บรักษาสารเคมีอันตราย  
ของบริษัท อีสเทิร์น ไทย คอนซัลต์ติ้ง 1992 จำกัด  
ใบอนุญาตเลขที่ ๐๒๐๒-๐๓-๒๕๖๔-๐๐๐๕

๑.	นายกะวีร์	สุธาทรัพย์
๒.	นางสาวนันท์ณภัส	แบขุนทด
๓.	นางสาวภัสรินทร์	ป้อมน้อย
๔.	นางสาวอจรรย์	จิตตะยโสธร
๕.	นางสาววรรณภา	ไชยศิริ
๖.	นางสาวพรพิมล	ภูมิคอนสาร
๗.	นางสาวธมลวรรณ	ผลอ้อ
๘.	นายภาณุพงศ์	บำรุงรส
๙.	นางสาวฉัตรสุดา	มงคลโกชน์

ทั้งนี้ ตั้งแต่วันที่ ๒๗ ธันวาคม พ.ศ. ๒๕๖๔ ถึงวันที่ ๒๖ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๒๗ ธันวาคม พ.ศ. ๒๕๖๔



(นายสมพจน์ กวางแก้ว)

ผู้ตรวจราชการกรม ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากร (เพิ่มเติม)

แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายในบรรยากาศ  
ของสถานที่ทำงานและสถานที่เก็บรักษาสารเคมีอันตราย  
ของบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด  
ใบอนุญาตเลขที่ ๐๒๐๒-๐๓-๒๕๖๔-๐๐๐๕

๑. นางสาวอภิรดี	ชื่นอารมย์
๒. นางสาวจิรพร	ปานคง
๓. นายชานูวัฒน์	โชตะวงศ์
๔. นางสาวพจนีย์	งามวิสัย
๕. นางสาวบุญเรือง	บุญถม
๖. นางสาวอาภาภรณ์	เสริมสนธิ
๗. นางสาวรสร	ต๋มวิจิตต์
๘. นางสาวพรรณทิพย์	ยุตะวัน
๙. นางสาวภาณิน	จันต๊ะสอน
๑๐. นางสาวสุนิษา	เฮ้งเส็ง
๑๑. นางสาวธัญลักษณ์	ขันโต
๑๒. นางสาวณัฐวดี	อำมาตทัศน์
๑๓. นางสาวระพิน	อันชั้น
๑๔. นางสาวสุทธิดา	สร้างแก้ว
๑๕. นางสาวสุมลิตรา	มีแก่น
๑๖. นางสาวอรชา	พันธ์เมือง
๑๗. นายกิตติ	ไพโรจน์
๑๘. นายชาญณรงค์	ตั้งธรรมรักษ์
๑๙. นางสาวดวงกมล	เนื้อทอง
๒๐. นางสาวคณิญา	โสดาลี
๒๑. นางสาววัชรภรณ์	อินทสุข

ทั้งนี้ ตั้งแต่วันที่ ๒๗ กุมภาพันธ์ พ.ศ. ๒๕๖๖ ถึงวันที่ ๒๖ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๒๗ กุมภาพันธ์ พ.ศ. ๒๕๖๖



(นายสมพจน์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

ที่ รง ๐๕๐๔/๐๔๒๐



กรมสวัสดิการและคุ้มครองแรงงาน  
ถนนมิตรไมตรี ดินแดง กรุงเทพฯ ๑๐๔๐๐

๒๗

กุมภาพันธ์ ๒๕๖๖

เรื่อง การอนุมัติเพิ่มเติมบุคลากรผู้ดำเนินการตรวจวัดและวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ

เรียน กรรมการผู้จัดการบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด

อ้างถึง หนังสือบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ที่ อทค.ตว. ๘๗๑/๒๕๖๕ ลงวันที่ ๕ สิงหาคม ๒๕๖๕

สิ่งที่ส่งมาด้วย ๑. รายชื่อบุคลากร (เพิ่มเติม) แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายฯ จำนวน ๑ ฉบับ  
๒. รายชื่อบุคลากร (เพิ่มเติม) แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ จำนวน ๑ ฉบับ

ตามหนังสือที่อ้างถึง บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ได้ขออนุมัติเพิ่มเติมบุคลากรผู้ดำเนินการตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายฯ จำนวน ๙ ราย และบุคลากรผู้ดำเนินการวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ จำนวน ๒๑ ราย สำหรับการเป็นผู้ให้บริการตรวจวัดและวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ ตามกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ ความละเอียดแจ้งแล้ว นั้น

กรมสวัสดิการและคุ้มครองแรงงาน ได้พิจารณาแล้วเห็นว่าบุคลากรผู้ดำเนินการตรวจวัดและวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ ของบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ที่ขออนุมัติเพิ่มเติมเป็นไปตามกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย ประกอบกับกฎกระทรวงกำหนดมาตรฐานในการบริหาร จัดการ และดำเนินการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงานเกี่ยวกับสารเคมีอันตราย พ.ศ. ๒๕๕๖ จึงอนุมัติให้ บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด เพิ่มเติมบุคลากรผู้ดำเนินการตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายฯ จำนวน ๙ ราย และบุคลากรผู้ดำเนินการวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ จำนวน ๒๑ ราย ดังกล่าว รายละเอียดปรากฏตามสิ่งที่ส่งมาด้วย ทั้งนี้ ขอให้บริษัทฯ ปฏิบัติตามกฎหมายการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย อย่างเคร่งครัด

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายสมพจน์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน

อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

กองความปลอดภัยแรงงาน

โทรศัพท์ ๐ ๒๔๔๘ ๙๑๒๘ - ๓๙ ต่อ ๗๐๓

โทรสาร ๐ ๒๔๔๘ ๙๑๔๓

ที่ รง ๐๕๐๔/๗๐๙๕



กรมสวัสดิการและคุ้มครองแรงงาน  
ถนนมิตรไมตรี ดินแดง กรุงเทพฯ ๑๐๔๐๐

๗๒

มีนาคม ๒๕๖๖

เรื่อง การอนุมัติเพิ่มเติมเครื่องมือตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายฯ

เรียน กรรมการผู้จัดการบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด

อ้างถึง หนังสือบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ที่ อทค.ตว. ๘๗๑/๒๕๖๕ ลงวันที่ ๕ สิงหาคม ๒๕๖๕  
สิ่งที่ส่งมาด้วย รายการเครื่องมือตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายฯ (เพิ่มเติม)จำนวน ๑ ฉบับ

ตามหนังสือที่อ้างถึง บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ได้ขออนุมัติเพิ่มเติม  
เครื่องมือตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายฯ สำหรับการเป็นผู้ให้บริการตรวจวัดระดับความเข้มข้น  
ของสารเคมีอันตรายฯ ตามกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย  
อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ ความละเอียดแจ้งแล้ว นั้น

กรมสวัสดิการและคุ้มครองแรงงาน ได้พิจารณาแล้วเห็นว่าบุคลากรผู้ดำเนินการตรวจวัด  
ระดับความเข้มข้นของสารเคมีอันตรายฯ ของบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ที่ขออนุมัติเพิ่มเติม  
เป็นไปตามกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัยฯ ประกอบกับ  
กฎกระทรวงกำหนดมาตรฐานในการบริหาร จัดการ และดำเนินการด้านความปลอดภัย อาชีวอนามัย  
และสภาพแวดล้อมในการทำงานเกี่ยวกับสารเคมีอันตราย พ.ศ. ๒๕๕๖ จึงอนุมัติให้ บริษัท อีสเทิร์น  
ไทย คอนซัลติ้ง 1992 จำกัด เพิ่มเติมเครื่องมือตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายฯ ดังกล่าว  
รายละเอียดปรากฏตามสิ่งที่ส่งมาด้วย ทั้งนี้ ขอให้บริษัทฯ ปฏิบัติตามกฎหมายการขึ้นทะเบียน  
และการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัยฯ อย่างเคร่งครัด

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายสมพจน์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน

อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

กองความปลอดภัยแรงงาน

โทรศัพท์ ๐ ๒๔๔๘ ๘๑๒๘ - ๓๙ ต่อ ๗๐๓

โทรสาร ๐ ๒๔๔๘ ๘๑๔๓



ที่ รง ๐๕๐๔/๗๒๕๗

กรมสวัสดิการและคุ้มครองแรงงาน  
ถนนมิตรไมตรี ดินแดง กรุงเทพฯ ๑๐๔๐๐

๖๙

กันยายน ๒๕๖๖

เรื่อง การอนุมัติเพิ่มเติมบุคลากรตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายในบรรยากาศของสถานที่ทำงาน และสถานที่เก็บรักษาสารเคมีอันตราย และเครื่องมือวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ

เรียน กรรมการผู้จัดการบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด

อ้างถึง หนังสือบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ที่ อทค.ตว. ๑๑๐๗/๒๕๖๖ ลงวันที่ ๑๗ สิงหาคม ๒๕๖๖

สิ่งที่ส่งมาด้วย ๑. รายชื่อบุคลากร (เพิ่มเติม) แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายฯ ลงวันที่ ๖ กันยายน พ.ศ. ๒๕๖๖ จำนวน ๑ ฉบับ  
๒. รายการเครื่องมือวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ (เพิ่มเติม) ลงวันที่ ๖ กันยายน พ.ศ. ๒๕๖๖ จำนวน ๑ ฉบับ

ตามหนังสือที่อ้างถึง บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ได้ขออนุมัติเพิ่มเติมบุคลากรตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายฯ จำนวน ๖ ราย และเครื่องมือวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ จำนวน ๕ เครื่อง สำหรับการเป็นผู้ให้บริการตรวจวัดและวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ ตามกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ ความละเอียดแจ้งแล้ว นั้น

กรมสวัสดิการและคุ้มครองแรงงาน ได้พิจารณาแล้วเห็นว่าบุคลากรตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายฯ และเครื่องมือวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ ของบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ที่ขออนุมัติเพิ่มเติมเป็นไปตามกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ และกฎกระทรวงกำหนดมาตรฐานในการบริหาร จัดการ และดำเนินการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงานเกี่ยวกับสารเคมีอันตราย พ.ศ. ๒๕๕๖ ประกอบกับประกาศกรมสวัสดิการและคุ้มครองแรงงาน เรื่อง หลักเกณฑ์ วิธีการตรวจวัด และการวิเคราะห์ผลการตรวจวัดระดับความเข้มข้นของสารเคมีอันตราย จึงอนุมัติให้ บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด เพิ่มเติมบุคลากรตรวจวัดระดับความเข้มข้นของสารเคมีอันตรายฯ และเครื่องมือวิเคราะห์ระดับความเข้มข้นของสารเคมีอันตรายฯ ดังกล่าว รายละเอียดปรากฏตามสิ่งที่ส่งมาด้วย ทั้งนี้ ขอให้บริษัทฯ ปฏิบัติตามกฎหมายการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัยฯ อย่างเคร่งครัด

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายสมพงษ์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน

อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

กองความปลอดภัยแรงงาน

โทรศัพท์ ๐ ๒๔๔๘ ๙๑๒๘ - ๓๙ ต่อ ๗๐๓

โทรสาร ๐ ๒๔๔๘ ๙๑๔๓



แบบ กภ.บุญ  
นิติบุคคล

## กรมสวัสดิการและคุ้มครองแรงงาน

### ใบอนุญาต

เป็นผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน

ใบอนุญาตเลขที่ ๐๔๐๑-๐๓-๒๕๖๔-๐๐๐๙

อนุญาตให้.....บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด.....

เลขทะเบียนนิติบุคคล ๐๒๐๕๕๓๕๐๐๔๕๗๘.....

ตั้งอยู่เลขที่ ๙๙๙ หมู่ที่ ๑๑ ตำบลหนองขาม อำเภอสรีราชา จังหวัดชลบุรี.....

เป็นนิติบุคคลผู้ให้บริการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน ตามกฎกระทรวง กำหนดมาตรฐานในการบริหาร จัดการ และดำเนินการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงานเกี่ยวกับความร้อน แสงสว่าง และเสียง พ.ศ. ๒๕๕๙ ในการตรวจวัดและวิเคราะห์ สภาวะการทำงานเกี่ยวกับระดับความร้อน ประกอบกับกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการ เพื่อส่งเสริมความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ แห่งพระราชบัญญัติ ความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๕๔ โดยมีบุคลากร จำนวน ๓ ราย

ทั้งนี้ ตั้งแต่วันที่ ๓๐ ธันวาคม พ.ศ. ๒๕๖๔ ถึงวันที่ ๒๙ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๓๐ ธันวาคม พ.ศ. ๒๕๖๔

(นายสมพจน์ กวางแก้ว)

ผู้ตรวจราชการกรม ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากรแนบท้ายใบอนุญาต  
เป็นนิติบุคคลผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน  
ของบริษัท อีสเทิร์น ไทย คอนซัลตัง 1992 จำกัด  
ใบอนุญาตเลขที่ ๐๔๐๑-๐๓-๒๕๖๔-๐๐๐๙

- |                 |                |
|-----------------|----------------|
| ๑. นางวรรณเพ็ญ  | เหลาจินดาวัฒน์ |
| ๒. นางสาวธนัชพร | กลั่นโสภณ      |
| ๓. นายวัฒนา     | โคตรหล้า       |

ทั้งนี้ ตั้งแต่วันที่ ๓๐ ธันวาคม พ.ศ. ๒๕๖๔ ถึงวันที่ ๒๙ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๓๐ ธันวาคม พ.ศ. ๒๕๖๔



(นายสมพจน์ กวางแก้ว)

ผู้ตรวจราชการกรม ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากร (เพิ่มเติม)  
แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดและวิเคราะห์สถานะการทำงานเกี่ยวกับระดับความร้อน  
ของบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด  
ใบอนุญาตเลขที่ ๐๔๐๑-๐๓-๒๕๖๔-๐๐๐๙

๑. นางสาวปนัดดา	ร่มรุกษ์
๒. นางสาวอภิรดี	ชื่นอารมย์
๓. นางสาวจุฑามาศ	เจริญพรหม
๔. นางสาววินิดา	จำปาดัน
๕. นางสาวธัญลักษณ์	ชนโต
๖. นางสาวจุฑารัตน์	สุขชาเกต
๗. นางสาวศวิตา	กิตติเนาวรัตน์
๘. นางสาวพรนภา	พงษ์เพชร

ทั้งนี้ ตั้งแต่วันที่ ๑๗ มิถุนายน พ.ศ. ๒๕๖๕ ถึงวันที่ ๒๙ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๑๗ มิถุนายน พ.ศ. ๒๕๖๕



(นายสมพจน์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากร (เพิ่มเติม)  
แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน  
ของบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด  
ใบอนุญาตเลขที่ ๐๔๐๑-๐๓-๒๕๖๔-๐๐๐๙

- |                    |              |
|--------------------|--------------|
| ๑. นางสาวอรอนงค์   | สิวงค์ศักดิ์ |
| ๒. นางสาวไพรยาภรณ์ | สังข์ทอง     |
| ๓. นางสาวยลดา      | พาลี         |

ทั้งนี้ ตั้งแต่วันที่ ๑๗ กันยายน พ.ศ. ๒๕๖๖ ถึงวันที่ ๒๙ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๑๗ กันยายน พ.ศ. ๒๕๖๖



(นายสมพจน์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน



แบบ ก.ภ.บญ  
นิติบุคคล

กรมสวัสดิการและคุ้มครองแรงงาน  
ใบอนุญาต

เป็นผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับแสงสว่าง

ใบอนุญาตเลขที่ ๐๔๐๒-๐๓-๒๕๖๔-๐๐๐๙

อนุญาตให้.....บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด.....

เลขทะเบียนนิติบุคคล.....๐๒๐๕๕๓๕๐๐๔๕๗๘.....

ตั้งอยู่ เลขที่ ๙๙๙ หมู่ที่ ๑๑ ตำบลหนองขาม อำเภอศรีราชา จังหวัดชลบุรี.....

เป็นนิติบุคคลผู้ให้บริการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน ตามกฎกระทรวง  
กำหนดมาตรฐานในการบริหาร จัดการ และดำเนินการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อม  
ในการทำงานเกี่ยวกับความร้อน แสงสว่าง และเสียง พ.ศ. ๒๕๕๙ ในการตรวจวัดและวิเคราะห์สภาวะ  
การทำงานเกี่ยวกับระดับแสงสว่าง ประกอบกับกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการ  
เพื่อส่งเสริมความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ แห่งพระราชบัญญัติ  
ความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๕๔ โดยมีบุคลากร จำนวน ๓ ราย

ทั้งนี้ ตั้งแต่วันที่ ๓๐ ธันวาคม พ.ศ. ๒๕๖๔ ถึงวันที่ ๒๙ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๓๐ ธันวาคม พ.ศ. ๒๕๖๔

(นายสมพจน์ กวางแก้ว)

ผู้ตรวจราชการกรม ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากรแนบท้ายใบอนุญาต  
เป็นนิติบุคคลผู้ให้บริการการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับแสงสว่าง  
ของบริษัท อีสเทิร์น ไทย คอนซัลต์ติ้ง 1992 จำกัด  
ใบอนุญาตเลขที่ ๐๔๐๒-๐๓-๒๕๖๔-๐๐๐๙

- |                 |                |
|-----------------|----------------|
| ๑. นางวรรณเพ็ญ  | เหลาจินดาวัฒน์ |
| ๒. นางสาวธนัชพร | กลั่นโสภณ      |
| ๓. นายวัฒนา     | โคตรหล้า       |

ทั้งนี้ ตั้งแต่วันที่ ๓๐ ธันวาคม พ.ศ. ๒๕๖๔ ถึงวันที่ ๒๙ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๓๐ ธันวาคม พ.ศ. ๒๕๖๔



(นายสมพนธ์ กวางแก้ว)

ผู้ตรวจราชการกรม ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากร (เพิ่มเติม)  
แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับแสงสว่าง  
ของบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด  
ใบอนุญาตเลขที่ ๐๔๐๒-๐๓-๒๕๖๔-๐๐๐๙

๑. นางสาวปนัดดา	ร่มรุักษ์
๒. นางสาวอภิตี	ชื่นอารมย์
๓. นางสาวจุฑามาศ	เจริญพรหม
๔. นางสาววินิดา	จำปาดัน
๕. นางสาวธัญลักษณ์	ขันโต
๖. นางสาวจุฑารัตน์	สุขชาเกต
๗. นางสาวศविตา	กิตติเนาวรัตน์
๘. นางสาวพรนภา	พงษ์เพชร

ทั้งนี้ ตั้งแต่วันที่ ๑๗ มิถุนายน พ.ศ. ๒๕๖๕ ถึงวันที่ ๒๙ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๑๗ มิถุนายน พ.ศ. ๒๕๖๕



(นายสมพจน์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากร (เพิ่มเติม)  
แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับแสงสว่าง  
ของบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด  
ใบอนุญาตเลขที่ ๐๔๐๒-๐๓-๒๕๖๔-๐๐๐๘

- |                    |              |
|--------------------|--------------|
| ๑. นางสาวอรอนงค์   | สิวงค์ศักดิ์ |
| ๒. นางสาวไพรยาภรณ์ | สังข์ทอง     |
| ๓. นางสาวยลดา      | พาลี         |

ทั้งนี้ ตั้งแต่วันที่ ๑๒ กันยายน พ.ศ. ๒๕๖๖ ถึงวันที่ ๒๙ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๑๒ กันยายน พ.ศ. ๒๕๖๖



(นายสมพจน์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน

อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน



แบบ ก.บ.บุญ  
นิติบุคคล

กรมสวัสดิการและคุ้มครองแรงงาน

ใบอนุญาต

เป็นผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับเสียง

ใบอนุญาตเลขที่ ๐๔๐๓-๐๓-๒๕๖๔-๐๐๐๙

อนุญาตให้.....บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด.....

เลขทะเบียนนิติบุคคล ๐๒๐๕๕๓๕๐๐๔๕๗๘.....

ตั้งอยู่ เลขที่ ๙๙๙ หมู่ที่ ๑๑ ตำบลหนองขาม อำเภอสรีราชา จังหวัดชลบุรี.....

เป็นนิติบุคคลผู้ให้บริการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน ตามกฎกระทรวง กำหนดมาตรฐานในการบริหาร จัดการ และดำเนินการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงานเกี่ยวกับความร้อน แสงสว่าง และเสียง พ.ศ. ๒๕๕๙ ในการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับเสียง ประกอบกับกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการ เพื่อส่งเสริมความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ แห่งพระราชบัญญัติความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๕๔ โดยมีบุคลากร จำนวน ๓ ราย

ทั้งนี้ ตั้งแต่วันที่ ๓๐ ธันวาคม พ.ศ. ๒๕๖๔ ถึงวันที่ ๒๙ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๓๐ ธันวาคม พ.ศ. ๒๕๖๔

(นายสมพจน์ กวางแก้ว)

ผู้ตรวจราชการกรม ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากรแนบท้ายใบอนุญาต  
เป็นนิติบุคคลผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับเสียง  
ของบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด  
ใบอนุญาตเลขที่ ๐๔๐๓-๐๓-๒๕๖๔-๐๐๐๙

- |                |                |
|----------------|----------------|
| ๑. นางวรรณเพ็ญ | เหลาจินดาวัฒน์ |
| ๒. นางสาวธัญพร | กลั่นโสภณ      |
| ๓. นายวัฒนา    | โคตรหล้า       |

ทั้งนี้ ตั้งแต่วันที่ ๓๐ ธันวาคม พ.ศ. ๒๕๖๔ ถึงวันที่ ๒๙ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๓๐ ธันวาคม พ.ศ. ๒๕๖๔



(นายสมพงษ์ กวางแก้ว)

ผู้ตรวจราชการกรม ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากร (เพิ่มเติม)  
แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับเสียง  
ของบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด  
ใบอนุญาตเลขที่ ๐๔๐๓-๐๓-๒๕๖๔-๐๐๐๙

๑. นางสาวปนัดดา	ร่มรุข
๒. นางสาวอภิตี	ชื่นอารมย์
๓. นางสาวจุฑามาศ	เจริญพรหม
๔. นางสาววินิดา	จำปาดัน
๕. นางสาวธัญลักษณ์	ชนโต
๖. นางสาวจุฑารัตน์	สุขขาเกต
๗. นางสาวศวิตา	กิตติเนาวรัตน์
๘. นางสาวพรนภา	พงษ์เพชร

ทั้งนี้ ตั้งแต่วันที่ ๑๗ มิถุนายน พ.ศ. ๒๕๖๕ ถึงวันที่ ๒๙ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๑๗ มิถุนายน พ.ศ. ๒๕๖๕



(นายสมพจน์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากร (เพิ่มเติม)

แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดและวิเคราะห์สถานะการทำงานเกี่ยวกับระดับเสียง  
ของบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด  
ใบอนุญาตเลขที่ ๐๔๐๓-๐๓-๒๕๖๔-๐๐๐๙

- |                      |               |
|----------------------|---------------|
| ๑. นางสาวอรอนงค์     | ลี้วงศ์ศักดิ์ |
| ๒. นางสาวไพบรียาภรณ์ | สังข์ทอง      |
| ๓. นางสาวยลดา        | พาลี          |

ทั้งนี้ ตั้งแต่วันที่ ๑๒ กันยายน พ.ศ. ๒๕๖๖ ถึงวันที่ ๒๙ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๑๒ กันยายน พ.ศ. ๒๕๖๖



(นายสมพจน์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

ที่ รง ๐๕๐๔/๒๗๗๒



กรมสวัสดิการและคุ้มครองแรงงาน  
ถนนมิตรไมตรี ดินแดง กรุงเทพฯ ๑๐๔๐๐

๖๗ มิถุนายน ๒๕๖๕

เรื่อง การอนุมัติเพิ่มเติมบุคลากรและเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน แสงสว่าง และเสียง

เรียน กรรมการผู้จัดการบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด

อ้างถึง หนังสือบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ที่ อทค.ตว. ๑๖๕/๒๕๖๕ และ อทค.ตว. ๑๖๖/๒๕๖๕ ลงวันที่ ๒๕ กุมภาพันธ์ ๒๕๖๕

สิ่งที่ส่งมาด้วย ๑. รายชื่อบุคลากร (เพิ่มเติม) แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน แสงสว่าง และเสียง จำนวน ๓ ฉบับ  
๒. รายการเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับเสียง (เพิ่มเติม) จำนวน ๑ ฉบับ

ตามหนังสือที่อ้างถึง บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ได้ขออนุมัติเพิ่มเติมบุคลากรผู้ดำเนินการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน แสงสว่าง และเสียง จำนวน ๘ ราย พร้อมเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับเสียง จำนวน ๑๘ เครื่อง สำหรับการเป็นผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน แสงสว่าง และเสียง ตามกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ ความละเอียดแจ้งแล้ว นั้น

กรมสวัสดิการและคุ้มครองแรงงาน ได้พิจารณาแล้วเห็นว่าบุคลากรและเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อนและเสียง ของบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ที่ขออนุมัติเพิ่มเติม มีคุณสมบัติตามกฎหมายกำหนดมาตรฐานในการบริหาร จัดการ และดำเนินการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงานเกี่ยวกับความร้อน แสงสว่าง และเสียง พ.ศ. ๒๕๕๙ ประกอบประกาศกรมสวัสดิการและคุ้มครองแรงงาน เรื่อง หลักเกณฑ์ วิธีการตรวจวัด และการวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน แสงสว่าง หรือเสียง รวมทั้งระยะเวลาและประเภทกิจการที่ต้องดำเนินการ ลงวันที่ ๘ กุมภาพันธ์ พ.ศ. ๒๕๖๑ จึงอนุมัติให้ บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด เพิ่มเติมบุคลากรและเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับเสียงดังกล่าว รายละเอียดปรากฏตามสิ่งที่ส่งมาด้วย ทั้งนี้ ขอให้บริษัทฯ ปฏิบัติตามกฎหมายการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัยฯ อย่างเคร่งครัด

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายสมพจน์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน

อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

กองความปลอดภัยแรงงาน

โทรศัพท์ ๐ ๒๔๔๘ ๙๑๒๘ - ๓๙ ต่อ ๗๐๒

โทรสาร ๐ ๒๔๔๘ ๙๑๔๓



ที่ รง ๐๕๐๔/๓๗๕

กรมสวัสดิการและคุ้มครองแรงงาน  
ถนนมิตรไมตรี ดินแดง กรุงเทพฯ ๑๐๔๐๐

๑๘

มกราคม ๒๕๖๖

เรื่อง การอนุมัติเพิ่มเติมเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน และเสียง  
เรียน กรรมการผู้จัดการบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด

อ้างถึง หนังสือบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ที่ อทค.ทว. 872/2565 ลงวันที่ ๕ สิงหาคม ๒๕๖๕  
สิ่งที่ส่งมาด้วย รายการเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน และเสียง (เพิ่มเติม)  
จำนวน ๒ ฉบับ

ตามหนังสือที่อ้างถึง บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ได้ขออนุมัติเพิ่มเติม  
เครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน และเสียง จำนวน ๒๘ เครื่อง สำหรับ  
การเป็นผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน แสงสว่าง และเสียง  
ตามกฎหมายกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย อาชีวอนามัย  
และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ ความละเอียดแจ้งแล้ว นั้น

กรมสวัสดิการและคุ้มครองแรงงาน ได้พิจารณาแล้วเห็นว่าเครื่องมือตรวจวัดและวิเคราะห์  
สภาวะการทำงานเกี่ยวกับระดับความร้อน และเสียง ของบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด  
ที่ขออนุมัติเพิ่มเติม มีคุณสมบัติตามกฎหมายกำหนดมาตรฐานในการบริหาร จัดการ และดำเนินการ  
ด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงานเกี่ยวกับความร้อน แสงสว่าง และเสียง พ.ศ. ๒๕๕๙  
ประกอบกับประกาศกรมสวัสดิการและคุ้มครองแรงงาน เรื่อง หลักเกณฑ์ วิธีการตรวจวัด และการวิเคราะห์สภาวะ  
การทำงานเกี่ยวกับระดับความร้อน แสงสว่าง หรือเสียง รวมทั้งระยะเวลาและประเภทกิจการที่ต้องดำเนินการ  
ลงวันที่ ๘ กุมภาพันธ์ พ.ศ. ๒๕๖๑ และที่แก้ไขเพิ่มเติม จึงอนุมัติให้ บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด  
เพิ่มเติมเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน และเสียง ดังกล่าว รายละเอียด  
ปรากฏตามสิ่งที่ส่งมาด้วย ทั้งนี้ ขอให้บริษัทฯ ปฏิบัติตามกฎหมายกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการ  
เพื่อส่งเสริมความปลอดภัยฯ อย่างเคร่งครัด

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายสมพจน์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน

อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

กองความปลอดภัยแรงงาน

โทรศัพท์ ๐ ๒๔๔๘ ๙๑๒๘ - ๓๙ ต่อ ๗๐๘

โทรสาร ๐ ๒๔๔๘ ๙๑๔๓

ที่ รง ๐๕๐๔/๓๖๖๓



กรมสวัสดิการและคุ้มครองแรงงาน

ถนนมิตรไมตรี ดินแดง กรุงเทพฯ ๑๐๔๐๐

๑๔ กันยายน ๒๕๖๖

เรื่อง การอนุมัติเพิ่มเติมบุคลากรและเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน แสงสว่าง และเสียง

เรียน กรรมการผู้จัดการบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด

อ้างถึง หนังสือบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ที่ อทค.ตว. ๑๑๐๖/๒๕๖๖ ลงวันที่ ๑๗ สิงหาคม ๒๕๖๖

- สิ่งที่ส่งมาด้วย ๑. รายชื่อบุคลากร (เพิ่มเติม) แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน ลงวันที่ ๑๔ กันยายน พ.ศ. ๒๕๖๖ จำนวน ๑ ฉบับ
๒. รายชื่อบุคลากร (เพิ่มเติม) แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับแสงสว่าง ลงวันที่ ๑๔ กันยายน พ.ศ. ๒๕๖๖ จำนวน ๑ ฉบับ
๓. รายชื่อบุคลากร (เพิ่มเติม) แนบท้ายใบอนุญาตเป็นนิติบุคคลผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับเสียง ลงวันที่ ๑๔ กันยายน พ.ศ. ๒๕๖๖ จำนวน ๑ ฉบับ
๔. รายการเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับเสียง (เพิ่มเติม) ลงวันที่ ๑๔ กันยายน พ.ศ. ๒๕๖๖ จำนวน ๑ ฉบับ

ตามหนังสือที่อ้างถึง บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ได้ขออนุมัติเพิ่มเติมบุคลากรผู้ดำเนินการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน แสงสว่าง และเสียง จำนวน ๓ ราย และเครื่องมือตรวจวัด รวมจำนวน ๒ เครื่อง สำหรับการเป็นผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน แสงสว่าง และเสียง ตามกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ เพื่อให้กรมสวัสดิการและคุ้มครองแรงงานพิจารณา ความละเอียดแจ้งแล้ว นั้น

กรมสวัสดิการและคุ้มครองแรงงาน ได้พิจารณาแล้วเห็นว่าบุคลากรและเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน แสงสว่าง และเสียง ที่ขออนุมัติเพิ่มเติม มีคุณสมบัติตามกฎกระทรวงกำหนดมาตรฐานในการบริหาร จัดการ และดำเนินการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงานเกี่ยวกับความร้อน แสงสว่าง และเสียง พ.ศ. ๒๕๕๙ ประกอบกับประกาศกรมสวัสดิการและคุ้มครองแรงงาน เรื่อง หลักเกณฑ์ วิธีการตรวจวัด และการวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน แสงสว่าง หรือเสียง รวมทั้งระยะเวลาและประเภทกิจการที่ต้องดำเนินการ ลงวันที่ ๘ กุมภาพันธ์ พ.ศ. ๒๕๖๑ และที่แก้ไขเพิ่มเติม จึงอนุมัติให้ บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด เพิ่มเติมบุคลากรและเครื่องมือตรวจวัดดังกล่าว รายละเอียดปรากฏตามสิ่งที่ส่งมาด้วย ทั้งนี้ ขอให้ปฏิบัติตามกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัยฯ อย่างเคร่งครัด

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายสมพจน์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน

อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

กองความปลอดภัยแรงงาน

โทรศัพท์ ๐ ๒๔๔๘ ๙๑๒๘ - ๓๙ ต่อ ๗๐๒

โทรสาร ๐ ๒๔๔๘ ๙๑๔๓



ที่ รง ๐๕๐๔/๙๖๒๐

กรมสวัสดิการและคุ้มครองแรงงาน  
ถนนมิตรไมตรี ดินแดง กรุงเทพฯ ๑๐๔๐๐

๑๕ พฤศจิกายน ๒๕๖๖

เรื่อง การอนุมัติเพิ่มเติมเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับแสงสว่าง  
เรียน กรรมการผู้จัดการบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด  
อ้างถึง หนังสือบริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ที่ อทค.ตว. ๑๔๘๐/๒๕๖๖ ลงวันที่ ๑๖ ตุลาคม ๒๕๖๖  
สิ่งที่ส่งมาด้วย รายการเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับแสงสว่าง (เพิ่มเติม) ลงวันที่  
๑๕ พฤศจิกายน พ.ศ. ๒๕๖๖ จำนวน ๑ ฉบับ

ตามหนังสือที่อ้างถึง บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด ได้ขออนุมัติเพิ่มเติมเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับแสงสว่าง รวมจำนวน ๒ เครื่อง สำหรับการเป็นผู้ให้บริการตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับแสงสว่าง ตามกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ เพื่อให้กรมสวัสดิการและคุ้มครองแรงงานพิจารณา ความละเอียดแจ้งแล้ว นั้น

กรมสวัสดิการและคุ้มครองแรงงาน ได้พิจารณาแล้วเห็นว่าเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับแสงสว่าง ที่ขออนุมัติเพิ่มเติม มีคุณสมบัติตามกฎกระทรวงกำหนดมาตรฐานในการบริหารจัดการ และดำเนินการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงานเกี่ยวกับความร้อน แสงสว่าง และเสียง พ.ศ. ๒๕๕๙ ประกอบกับประกาศกรมสวัสดิการและคุ้มครองแรงงาน เรื่อง หลักเกณฑ์ วิธีการตรวจวัดและการวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับความร้อน แสงสว่าง หรือเสียง รวมทั้งระยะเวลาและประเภทกิจการที่ต้องดำเนินการ ลงวันที่ ๘ กุมภาพันธ์ พ.ศ. ๒๕๖๑ และที่แก้ไขเพิ่มเติม จึงอนุมัติให้ บริษัท อีสเทิร์น ไทย คอนซัลติ้ง 1992 จำกัด เพิ่มเติมเครื่องมือตรวจวัดและวิเคราะห์สภาวะการทำงานเกี่ยวกับระดับแสงสว่างดังกล่าว รายละเอียดปรากฏตามสิ่งที่ส่งมาด้วย ทั้งนี้ ขอให้ปฏิบัติตามกฎกระทรวงการขึ้นทะเบียนและการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัยฯ อย่างเคร่งครัด

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายสมพจน์ กวางแก้ว)

รองอธิบดี ปฏิบัติราชการแทน

อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

กองความปลอดภัยแรงงาน

โทรศัพท์ ๐ ๒๔๔๘ ๙๑๒๘ - ๓๙ ต่อ ๗๐๒

โทรสาร ๐ ๒๔๔๘ ๙๑๔๓