

## ภาคผนวกที่ 4

ใบรับรองการสอบเทียบเครื่องมือ



## Certificate of Calibration

Certificate No. : 66-400618-1

Page : 1 of 2

Submitted by :

M E T Company Limited

36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

Equipment :

Digital Thermometer with Thermistor Probe

Temperature Indicator

Manufacturer : Hanna

Model : HI8424

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 06190028101

ID No. : MET-ph09/64

Thermistor Probe

Model : HI7662

Sheath Material : Stainless

Diameter : 3 mm.

Length : 115 mm.

Serial No. : 0815071N

ID No. : MET-ph09/64

Environment :

On site calibration was carried out at the Laboratory, M E T Company Limited

Ambient Temperature : (24.8 to 25.7) °C

Relative Humidity : (55 to 60) %

Line Voltage : (224.5 to 225.0) VAC

Date of Received :

07 November 2023

Date of Calibration :

07 November 2023

Date of Issue :

11 November 2023

Calibrated by :

Pempoon Champu

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4003

by compared with PRT in the dry-well calibrator at the constant controlled temperature.

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

1. Platinum Resistance Thermometer (PRT)

ID No. Cert.No. Due Date

Traceability

400002 TT-0074-22 20 Jun 2024

National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No. Cert.No. Due Date

Traceability

400033 22E569 22 Feb 2024

National Institute of Metrology Thailand (NIMT)

Approved by

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

Certificate No. : 66-400618-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

| Immersion Depth<br>( mm. ) | Standard Reading<br>( °C ) | UUC Reading<br>( °C ) | Correction<br>( °C ) | Uncertainty<br>( ± °C ) |
|----------------------------|----------------------------|-----------------------|----------------------|-------------------------|
| 115                        | 10.005                     | 10.0                  | 0.0                  | 0.19                    |
| 115                        | 30.003                     | 30.0                  | 0.0                  | 0.19                    |
| 115                        | 50.006                     | 50.0                  | 0.0                  | 0.19                    |

Remark

UUC : Unit Under Calibration

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

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

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## Certificate of Calibration

Certificate No. : 66-420109-2

Page : 1 of 2

Submitted by :

M E T Company Limited

36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

Equipment :

pH Meter with electrode

pH meter

Manufacturer : Hanna Model : HI8424

Range : N/A pH Resolution : 0.01 pH

Serial No. : 06190028101 ID No. : MET-pH09/64

Electrode

Model : HI1230 Serial No. : 081319AN

Environment : On site calibration was carried out at the Laboratory, M E T Company Limited

Ambient Temperature : (24.8 to 25.7) °C

Relative Humidity : (55 to 60) %

Date of Received : 07 November 2023

Date of Calibration : 07 November 2023

Date of Issue : 11 November 2023

Calibrated by : Pernpon Chanpu

Calibration Method : In-house method CAL-M4201 direct measurement by using standard voltage calibrator and using certified reference material (CRM)

Reference Standard Instruments : This certification is traceable to the International System of Units

1. Multiproduct Calibrator

| ID No. | Cert.No.      | Due Date    | Traceability                                    |
|--------|---------------|-------------|---|
| 400005 | SG-E-00307/66 | 23 Aug 2025 | National Institute of Metrology Thailand (NIMT) |

2. Certified Reference Material (CRM)

| pH    | Cert.No. | Lot No. | Exp.Date    | Traceability  |
|-------|----------|---------|-------------|---|
| 4.008 | 61270213 | 915161  | 19 Jul 2025 | CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025 |
| 6.985 | 61275614 | 898428  | 28 May 2024 | CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025 |
| 9.997 | 61281073 | 915163  | 19 Jul 2024 | CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025 |

Approved by :

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

Certificate No. : 66-420109-2

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

Performing standard curve by Multiproduct Calibrator at pH (4,7) and (7,10)

| Adjustment Curve<br>at nominal pH | Applied Voltage<br>( mV ) | Nominal Value<br>( pH ) | UUC Reading |        | Correction<br>( mV ) | Uncertainty<br>( ± mV ) |
|-----------------------------------|---------------------------|-------------------------|-------------|--------|----------------------|-------------------------|
|                                   |                           |                         | ( pH )      | ( mV ) |                      |                         |
| 4, 7                              | 177.4800                  | 4                       | 4.00        | 177.5  | 0.0                  | 0.12                    |
|                                   | 0.0000                    | 7                       | 7.00        | 0.1    | -0.1                 | 0.086                   |
| 7,10                              | 0.0000                    | 7                       | 7.00        | 0.1    | -0.1                 | 0.086                   |
|                                   | -177.4800                 | 10                      | 10.00       | -177.3 | -0.2                 | 0.12                    |

Function : pH meter with electrode

Performing a three - buffer standard curve using buffer nominal pH (4,7) and (7,10)

| Adjustment Curve<br>at nominal pH | Standard Buffer<br>( pH ) | UUC Reading<br>( pH ) | Correction<br>( pH ) | Uncertainty<br>( ± pH ) |
|-----------------------------------|---------------------------|-----------------------|----------------------|-------------------------|
| 4, 7                              | 4.008                     | 4.01                  | 0.00                 | 0.0091                  |
|                                   | 6.985                     | 7.01                  | -0.02                | 0.012                   |
| 7, 10                             | 6.985                     | 7.01                  | -0.02                | 0.012                   |
|                                   | 9.997                     | 10.01                 | -0.01                | 0.014                   |

Remark

UUC : Unit Under Calibration

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%

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## Certificate of Calibration

Page : 1 of 2

Certificate No. : 66-400476-1

Submitted by : M E T Company Limited

36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

Equipment : Air Chamber (Oven)

Manufacturer : Memmert

Range : N/A °C

Serial No. : b197,0985

Model : UM 100

Resolution : 0.1 °C

ID No. : MET-OV01/46

Environment : On site calibration was carried out at the Laboratory, M E T Company Limited

Ambient Temperature : (31.0 to 32.0) °C

Relative Humidity : (55 to 60) %

Line Voltage : (210.0 to 210.8) V

Date of Received : 23 August 2023

Date of Calibration : 23 August 2023

Date of Issue : 23 August 2023

Calibrated by : Permporn Chianpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Digital Thermometer with Thermocouple probe

ID No. Cert.No.

400029 &amp; 400032 66-400228-1

Traceability

National Institute of Metrology Thailand (NIMT)

Due Date

25 Oct 2023

Approved

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

Page : 2 of 2

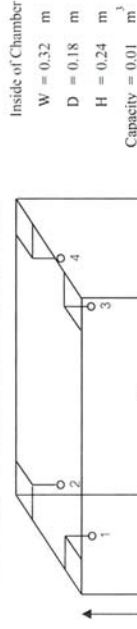
Certificate No. : 66-400476-1

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



| Test Point<br>(°C) | Setting Temperature<br>(°C) | Indicating Temperature<br>(°C) | Measured Temperature (°C) @ Sensor No. |       |       |       |       |       |       |       |       | Uncertainty<br>(± °C) |
|--------------------|-----------------------------|--------------------------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-----------------------|
|                    |                             |                                | 1                                      | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     |                       |
| 180.0              | 180.0                       | 180.0                          | 181.7                                  | 180.1 | 180.5 | 180.7 | 181.5 | 181.7 | 181.3 | 181.4 | 180.1 | 0.95                  |

| Test Point<br>(°C) | Setting Temperature<br>(°C) | Indicating Temperature<br>(°C) | Measured Uniformity<br>(°C) |  |  | Measured Stability<br>(°C) |  |  | Overall Variation<br>(°C) |
|--------------------|-----------------------------|--------------------------------|-----------------------------|--|--|----------------------------|--|--|---------------------------|
|                    |                             |                                | 1.7                         |  |  | 0.2                        |  |  |                           |
| 180.0              | 180.0                       | 180.0                          | 1.7                         |  |  | 0.2                        |  |  | 2.0                       |

Remark: The uncertainty is not combine uniformity of the air chamber

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%

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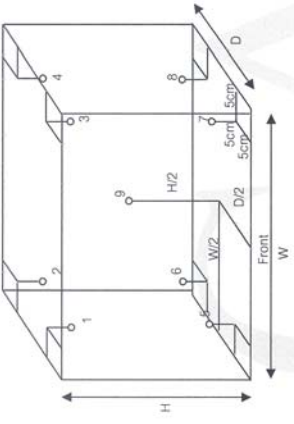


Submitted by : M E T Company Limited  
36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110  
Equipment : Temperature controlled enclosure (Oven)  
Manufacturer : Memmert  
Range : N/A °C  
Serial No. : b197.0985  
Model : UM 100  
Resolution : 0.1 °C  
ID No. : MET-OV01/46  
Environment : On site calibration was carried out at the Laboratory, M E T Company Limited  
Ambient Temperature : (30.0 to 31.0) °C  
Relative Humidity : (50 to 55) %  
Line Voltage : (210.0 to 210.8) V  
Date of Received : 20 August 2024  
Date of Calibration : 20 August 2024  
Date of Issue : 21 August 2024  
Calibrated by : Pempon Chianpu  
Calibration Method : CAL-M4004, TLAS G-20  
The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units  
Standard Digital Thermometer with Thermocouple probe  
ID No. Cert.No. Due Date Traceability  
400029 & 400032 67-400247-1 26 Oct 2024 National Institute of Metrology Thailand (NIMT)

Result of Calibration : Without Adjustment  
UUC Condition As-Received : Good  
Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber  
W = 0.32 m  
D = 0.18 m  
H = 0.24 m  
Capacity = 0.01 m<sup>3</sup>

| Test Point<br>(°C) | Setting Temperature<br>(°C) | Indicating Temperature<br>(°C) | Measured Temperature (°C) @ Sensor No. |       |       |       |       |       |       |       |       | Uncertainty<br>(± °C) |
|--------------------|-----------------------------|--------------------------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-----------------------|
|                    |                             |                                | 1                                      | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     |                       |
| 180.0              | 180.0                       | 180.0                          | 181.6                                  | 181.2 | 181.9 | 180.7 | 180.7 | 181.9 | 179.2 | 179.1 | 180.8 | 0.95                  |

| Test Point<br>(°C) | Setting Temperature<br>(°C) | Indicating Temperature<br>(°C) | Measured Uniformity<br>(°C) | Measured Stability<br>(°C) | Overall Variation<br>(°C) |
|--------------------|-----------------------------|--------------------------------|-----------------------------|----------------------------|---------------------------|
|                    |                             |                                |                             |                            |                           |
| 180.0              | 180.0                       | 180.0                          | 1.9                         | 0.2                        | 3.1                       |

Remark The uncertainty is not combine uniformity of the air chamber  
This result of calibration was found accurate as shown on date and place of calibration only.  
This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%

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## Certificate of Calibration

Certificate No. : 66-400691-1

Page : 1 of 2

Submitted by : M E T Company Limited

Equipment : 36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

Air Chamber (Incubator)

Manufacturer : M-LAB

Range : N/A °C

Resolution : 0.1 °C

ID No. : MET-B102/64

Serial No. : 1022

On site calibration was carried out at the Laboratory, M E T Company Limited

Ambient Temperature : (24.0 to 25.0) °C

Relative Humidity : (50.0 to 55) %

Line Voltage : (225.0 to 226.0) V

Date of Received : 19 December 2023

Date of Calibration : 19 December 2023

Date of Issue : 23 December 2023

Calibrated by : Penmon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Digital Thermometer with RTD Probe

ID No. : 400046 &amp; 400042

Cert. No. : 66-400453-1

Due Date : 31 Jan 2024

Traceability : National Institute of Metrology Thailand (NIMT)

Approved

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

Certificate No. : 66-400691-1

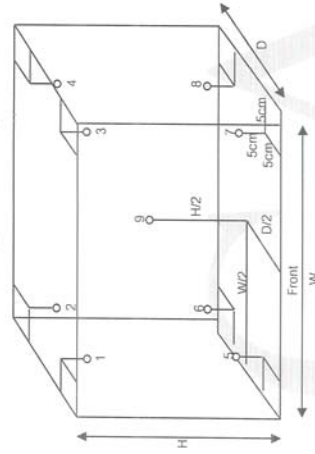
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber  
W = 0.37 m  
D = 0.33 m  
H = 1.14 m  
Capacity = 0.14 m<sup>3</sup>

| Test Point<br>(°C) | Setting Temperature<br>(°C) | Indicating Temperature<br>(°C) | Measured Temperature (°C) @ Sensor No. |       |       |       |       |       |       |       |       | Uncertainty<br>(± °C) |
|--------------------|-----------------------------|--------------------------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-----------------------|
|                    |                             |                                | 1                                      | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     |                       |
| 20.0               | 20.0                        | 20.0                           | 20.12                                  | 19.96 | 20.01 | 19.96 | 20.37 | 20.33 | 20.07 | 20.21 | 20.44 | 0.32                  |

| Test Point<br>(°C) | Setting Temperature<br>(°C) | Indicating Temperature<br>(°C) | Measured           |                   | Overall Variation<br>(°C) |
|--------------------|-----------------------------|--------------------------------|--------------------|-------------------|---------------------------|
|                    |                             |                                | Uniformity<br>(°C) | Stability<br>(°C) |                           |
| 20.0               | 20.0                        | 20.0                           | 0.51               | 0.04              | 0.53                      |

Remarks The uncertainty is not combine uniformity of the air chamber

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%

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## Certificate of Calibration

Certificate No. : 67-400505-5 Page : 1 of 2

Submitted by : M E T Company Limited

36/659 Moo 6, T.Bangrakpattana, A.Banghuatong, Nonthaburi 11110

Equipment : Temperature controlled enclosure (Incubator)

Manufacturer : M-LAB

Model : BIC-140

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 240412

ID No. : MET-BI01/55

Environment : On site calibration was carried out at the Laboratory, M E T Company Limited

Ambient Temperature : (26.0 to 26.5) °C

Relative Humidity : (40 to 45) %

Line Voltage : (210.0 to 210.8) V

Date of Received : 20 August 2024

Date of Calibration : 20 August 2024

Date of Issue : 21 August 2024

Calibrated by : Permpon Chaupu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Digital Thermometer with RTD Probe

ID No. Cert. No.

400029 &amp; 400043 67-400245-1

Traceability

Due Date

27 Oct 2024 National Institute of Metrology Thailand (NIMT)

Approved

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

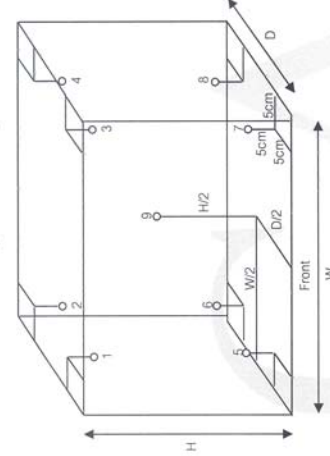
Certificate No. : 67-400505-5 Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber  
W = 0.37 m  
D = 0.33 m  
H = 1.14 m  
Capacity = 0.14 m<sup>3</sup>

| Test Point<br>(°C) | Setting Temperature<br>(°C) | Indicating Temperature<br>(°C) | Measured Temperature (°C) @ Sensor No. |       |       |                            |       |       |                           |       |       | Uncertainty<br>(± °C) |
|--------------------|-----------------------------|--------------------------------|--|-------|-------|----------------------------|-------|-------|---------------------------|-------|-------|-----------------------|
|                    |                             |                                | 1                                      | 2     | 3     | 4                          | 5     | 6     | 7                         | 8     | 9     |                       |
| 20.0               | 20.0                        | 20.0                           | 19.77                                  | 19.63 | 19.60 | 19.50                      | 20.50 | 20.34 | 20.20                     | 19.86 | 20.04 | 0.33                  |
|                    |                             |                                | Measured Uniformity<br>(°C)            |       |       | Measured Stability<br>(°C) |       |       | Overall Variation<br>(°C) |       |       |                       |
|                    |                             |                                | 20.0                                   |       |       | 20.0                       |       |       | 1.07                      |       |       |                       |

Remark The uncertainty is not combine uniformity of the air chamber

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%

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## Calibration Certificate

Cert. No. : CT-23-10-23746

Page : 1 of 4

Issued date : 18/10/2023

Equipment : COD Reactor , Manufacturer : MLAB , Model : DB1602

S/N = 0169 , Customer ID = -

Client : M E T COMPANY LIMITED.

36/659 M.6 Bang Rak Phatthana, Bang Bua Thong, Nonthaburi 11110

Received Date : 10 October 2023

Ref. Job No. : SO6610-00020

Calibrate by : Mr. Pramot Srisukum

Cert. prepare by : Ms. Ratcha Kaewboontheng

Calibrated Date : 10 October 2023

Approved by : Mr. Montree Ruschasekul

Calibration Place : Laboratory of Metrology Technical Co., Ltd.

Environment Condition : Temperature  $26.2 \pm 0.8$  (°C) , Humidity  $65.5 \pm 7.5$  (%RH)

Calibration Method : Measure temperature distribution by 9 channels in flat level. (MTEC WI No. # WPCAL-02-00G-R01)

### Reference Standard Instrument :

| No | Instrument             | code         | Model | Due date |
|----|------------------------|--------------|-------|----------|
| 1  | Temperature Datalogger | MTEC-CE-0180 | MLAB  | 10/2023  |
| 2  | Thermo Hygrometer      | MTEC-CE-0181 | TP-50 | 06/2024  |

### Condition of certificate :

- (1) This certificate is traceable to International System of units (SI Units). (2) This certificate was certified only for the instrument we calibrated.  
(3) This result of calibration was found accurate as show on date and place of calibration only. (4) The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k =$  (see result table) , providing a level of confidence of approximately 95%. (5) This certificate may not be reproduced other than in full, except with the prior written approval of the head of Calibration Division, Metrology Technical Co., Ltd.

CEP04-R01-0501

44 Soi Chao Chua 2 Soi 40, Laifon Buri Bangkapi, Tel: 02-2535-0206, 02-2535-1196, Fax: 02-2535-0016, Email: metro@metro.co.th, www.mtc.co.th

Certificate No. : CT-23-10-23746

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### Calibration Result :

Condition of UUC :

- Without Adjustment
- Immersion : 1/2 of the depth of the hole



- (1) The quoted uncertainty includes with "Babel".  
(2) Stability : One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching stable state.  
(3) 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.  
(4) Overall variation : The difference of the maximum and the minimum measured temperature throughout observation time.

Pic 1 : Position of each sensor No.

### Section 1 : Report of Temperature distribution

Unit : (°C)

| Calibration Point | UUC Setting (°) | UUC Reading (°) | Measured Temperature @ Sensor No. |        |        |        |        |        |        |        |       | Uncertainty (°) |
|-------------------|-----------------|-----------------|-----------------------------------|--------|--------|--------|--------|--------|--------|--------|-------|-----------------|
|                   |                 |                 | #1                                | #2     | #3     | #4     | #5     | #6     | #7     | #8     | #9    |                 |
| 150               | 150             | 150             | 148.65                            | 148.65 | 150.55 | 150.08 | 150.76 | 151.00 | 150.35 | 148.95 | 0.637 | 2               |

(\*) = The average of 30 values in each point, (\*\*) = Coverage factor (k) value

### Section 2 : Report of Chamber Performance

Unit : (°C)

| Calibration Point | UUC Setting | UUC Reading (°) | Temperature Uniformity | Temperature Stability (± °C) | Temperature Overall Variation |
|-------------------|-------------|-----------------|------------------------|------------------------------|-------------------------------|
| 150               | 150         | 150             | 1.11                   | 0.05                         | 1.61                          |

(\*) = The average of 30 values in each point

Approved Signatory

44 Soi Chao Chua 2 Soi 40, Laifon Buri Bangkapi, Tel: 02-2535-0206, 02-2535-1196, Fax: 02-2535-0016, Email: metro@metro.co.th, www.mtc.co.th



Certificate No. : CT-23-10-23746

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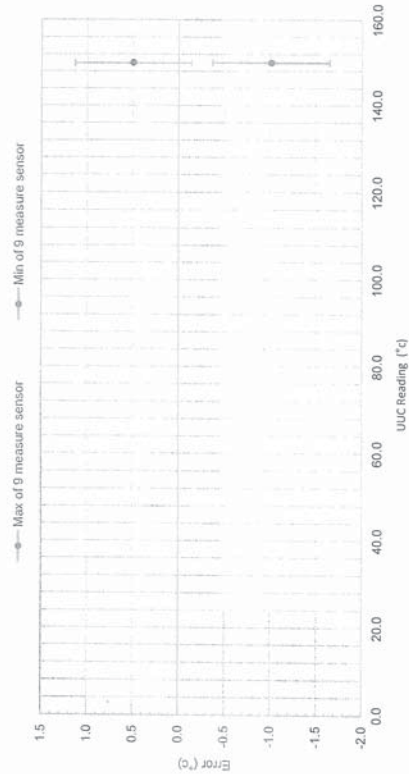
Section 3 : Possible of temperature. Show minimum and maximum of the average values and include with uncertainty of measurement. The average values is average of each position standard sensor throughout observation time.

Unit : (°C)

| Calibration Point | UUC Setting (*) | UUC Reading (*) | Possible of Minimum temperature | Possible of Maximum temperature |
|-------------------|-----------------|-----------------|---------------------------------|---------------------------------|
| 150               | 150             | 150             | 148.86                          | 151.64                          |
|                   |                 |                 |                                 |                                 |
|                   |                 |                 |                                 |                                 |

(\*) = The average of 30 values in each point

Section 4: Trend of accuracy



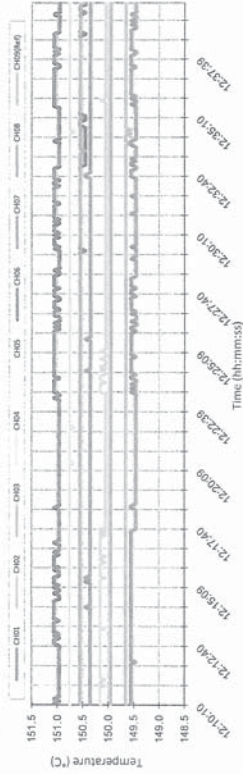
Approved Signatory :    
 44 Soi Chok Chai 4 Soi 40, Lat Phai, Bangkok, Tel : 02-2514-5205, 02-2515-7106, Fax : 02-2514-5015, Email : contact@metrology.co.th, www.metrology.co.th

Certificate No. : CT-23-10-23746

Page : 4 of 4

Section 5 : Graph report for Temperature distribution , not include uncertainty of measurement

(5.1) Temperature Distribution at UUC Reading 150 °C



Approved Signatory : 

44 Soi Chok Chai 4 Soi 40, Lat Phai, Bangkok, Tel : 02-2514-5205, 02-2515-7106, Fax : 02-2514-5015, Email : contact@metrology.co.th, www.metrology.co.th



## Certificate of Calibration

**Equipment:** COD Reactor  
**Model:** DB1602  
**Serial No. (or ID.):** 0169  
**Manufacturer:** M-LAB  
**Condition:** In Condition  
**Covers:** Open (Max)  
**Locations heating Block:** Single

**Customer:** M E T CO.,LTD.  
36/659 Moo 6, Tambol Bangrakpattana,  
Amphur Bangbuathong, Nonthaburi 11110 Thailand.

**Environment Condition:** Temperature: 28 °C ± 0.9 °C  
Humidity: 58 %RH ± 5.1 %RH  
Voltage: 229 VAC ± 3.9 VAC

**Calibration Place:** M E T CO.,LTD. ( Laboratory Room )  
36/659 Moo 6, Tambol Bangrakpattana,  
Amphur Bangbuathong, Nonthaburi 11110 Thailand.

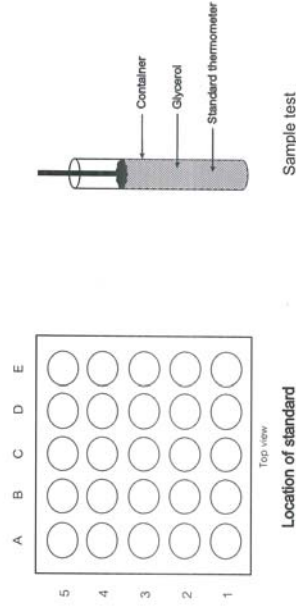
**Calibration By:** Mr. Nakarin Ruenros  
**Calibration Date:** 28 October 2024  
**The Method used:** In house method, CAL-WI-59, base on Direct Measurement with Standard Thermometer  
**Traceability:** This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.  
Certificate No. C10240016

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.  
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).  
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.



Certificate No.: C17240180

Page: 2 of 4



### Standard Installation Locations

The standard thermometer touches the lower end of the boring

### Definitions

**Indicating Temperature:** The average reading of indicating device which forms the integral part of the unit under calibration.

**Measured Temperature:** The average reading of standards at any positions or location.

**Measured Stability:** The one-half of greatest maximum difference of measured temperatures at any one probe.



Calibration Results:  
Before Adjustment

| Locations heating Block:  |  | Setting (°C) |        | Unit Under Calibration (°C) |        |        |
|---------------------------|--|--------------|--------|-----------------------------|--------|--------|
| Single                    |  | 150.0        |        | 150.0                       |        |        |
| Location heating Block:   |  |              |        |                             |        |        |
| Measured Temperature (°C) |  | A1           | A2     | A3                          | A4     | A5     |
|                           |  | 146.78       | 146.54 | 146.81                      | 147.54 | 146.45 |
| Location heating Block:   |  |              |        |                             |        |        |
| Measured Temperature (°C) |  | B1           | B2     | B3                          | B4     | B5     |
|                           |  | 145.67       | 147.87 | 146.52                      | 148.41 | 147.12 |
| Location heating Block:   |  |              |        |                             |        |        |
| Measured Temperature (°C) |  | C1           | C2     | C3                          | C4     | C5     |
|                           |  | 145.90       | 147.99 | 149.21                      | 147.88 | 146.56 |
| Location heating Block:   |  |              |        |                             |        |        |
| Measured Temperature (°C) |  | D1           | D2     | D3                          | D4     | D5     |
|                           |  | 147.16       | 147.34 | 148.23                      | 148.09 | 146.65 |
| Location heating Block:   |  |              |        |                             |        |        |
| Measured Temperature (°C) |  | E1           | E2     | E3                          | E4     | E5     |
|                           |  | 146.31       | 148.42 | 148.67                      | 148.26 | 147.45 |



Calibration Results:  
After Adjustment

Measured temperature at the spread locations:

| Locations heating Block: |  | Setting (°C) |  | Unit Under Calibration (°C) |  |
|--------------------------|--|--------------|--|-----------------------------|--|
| Single                   |  | 150.0        |  | 150.0                       |  |

| Location heating Block: |  | Measured Temperature (°C) |        | Correction of UUC (°C) |       | Uncertainty (± °C) |      |
|-------------------------|--|---------------------------|--------|------------------------|-------|--------------------|------|
|                         |  | A1                        | 149.74 |                        | -0.26 |                    | 0.30 |
|                         |  | A2                        | 149.00 |                        | -1.00 |                    | 0.31 |
|                         |  | A3                        | 149.61 |                        | -0.39 |                    | 0.30 |
|                         |  | A4                        | 149.65 |                        | -0.35 |                    | 0.31 |
|                         |  | A5                        | 150.15 |                        | 0.15  |                    | 0.31 |
|                         |  | B1                        | 149.34 |                        | -0.66 |                    | 0.30 |
|                         |  | B2                        | 151.09 |                        | 1.09  |                    | 0.31 |
|                         |  | B3                        | 149.19 |                        | -0.81 |                    | 0.33 |
|                         |  | B4                        | 150.76 |                        | 0.76  |                    | 0.33 |
|                         |  | B5                        | 149.58 |                        | -0.42 |                    | 0.31 |
|                         |  | C1                        | 148.85 |                        | -1.15 |                    | 0.31 |
|                         |  | C2                        | 150.41 |                        | 0.41  |                    | 0.31 |
|                         |  | C3                        | 151.36 |                        | 1.36  |                    | 0.32 |
|                         |  | C4                        | 150.02 |                        | 0.02  |                    | 0.34 |
|                         |  | C5                        | 148.94 |                        | -1.06 |                    | 0.34 |
|                         |  | D1                        | 148.79 |                        | -1.21 |                    | 0.31 |
|                         |  | D2                        | 149.79 |                        | -0.21 |                    | 0.32 |
|                         |  | D3                        | 150.77 |                        | 0.77  |                    | 0.30 |
|                         |  | D4                        | 150.52 |                        | 0.52  |                    | 0.30 |
|                         |  | D5                        | 149.34 |                        | -0.66 |                    | 0.32 |
|                         |  | E1                        | 150.36 |                        | 0.36  |                    | 0.31 |
|                         |  | E2                        | 150.27 |                        | 0.27  |                    | 0.30 |
|                         |  | E3                        | 150.30 |                        | 0.30  |                    | 0.31 |
|                         |  | E4                        | 150.79 |                        | 0.79  |                    | 0.32 |
|                         |  | E5                        | 150.28 |                        | 0.28  |                    | 0.30 |

Characterization of the unit under calibration:

| Locations heating Block | Desired (°C) |  | Unit Under Calibration (°C) |         | Measured Temperature (°C) |  |
|-------------------------|--------------|--|-----------------------------|---------|---------------------------|--|
|                         |              |  | Setting                     | Reading | Stability (±°C)           |  |
| Single                  | 150.0        |  | 150.0                       | 150.0   | 0.14                      |  |

The End of Certificate





ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00047579

ชนิดเครื่องมือ: COD Reactor  
หมายเลขเครื่อง: 0169  
รุ่น: DB1602

| ตรวจสอบ (รับ)                       |                          | รายการตรวจสอบ                        | ตรวจสอบ (ส่ง)                       |                          | หมายเหตุ |
|-------------------------------------|--------------------------|--------------------------------------|-------------------------------------|--------------------------|----------|
| 28 Oct 2024                         |                          |                                      | 28 Oct. 2024                        |                          |          |
| ปกติ                                | ไม่ปกติ                  |                                      | ปกติ                                | ไม่ปกติ                  |          |
|                                     |                          | General                              |                                     |                          |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 1. สายไฟ                             | <input checked="" type="checkbox"/> | <input type="checkbox"/> |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 2. การทำงาน Main Switch              | <input checked="" type="checkbox"/> | <input type="checkbox"/> |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3. การทำงาน Selector Key             | <input checked="" type="checkbox"/> | <input type="checkbox"/> |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4. การแสดงผล Display                 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 5. สภาพ Hole                         | <input checked="" type="checkbox"/> | <input type="checkbox"/> |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 6. สภาพฝาปิด                         | <input checked="" type="checkbox"/> | <input type="checkbox"/> |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 7. สภาพตัวเครื่อง                    | <input checked="" type="checkbox"/> | <input type="checkbox"/> |          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 8. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง | <input checked="" type="checkbox"/> | <input type="checkbox"/> |          |

“จนแล้วจนรอด”

Mr. Nakanin Ruenros  
Service Engineer

บริษัท ดีเคเอส อีเอส จำกัด  
DKSH Technology Limited  
2533 สุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260  
2533 Sukhumvit Road, Bangchak, Phra Khanong, Bangkok 10260  
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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Tel:(02) 964-6211 Fax:(02) 964-5155, e-mail: cal@caltech.cal@ahoo.com, cal@

## Certificate of Calibration

**Certificate No. :** 66-400476-2

Submitted by : MET Company Limited

36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

**Equipment :** Air Chamber (Oven)

Manufacturer : Binder  
Model : ED53

Range : N/A °C  
Resolution : 1 °C

Serial No. : 13-07419

On-site calibration was carried out at the Laboratory MFT Company Limited

Ambient Temperature : (31.0 to 32.0) °C

Relative Humidity : (55 to 60) %

Line Voltage : (210.0 to 210.8) V

Date of Received : 23 August 2023

**Date of Calibration :** 23 August 2023

Date of Issue : 23 August 2023

Calibrated by : Permpoon Chanpu

Calibration Method : CAL-M4004, TIAS G-20

The temperature scale used was based on ITS-90

**Reference Standard Instruments :** This certification is traceable to the International System of Units

Standard Digital Thermometer with Thermocouple probe

ID No. \_\_\_\_\_ Cert. No. \_\_\_\_\_

400029 &amp; 400030 66-400227-1

### Traceability

National Institute of Metrology Thailand (NIMT)

A



The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0037-03

## Certificate of Calibration

Certificate No. : 66-400476-2

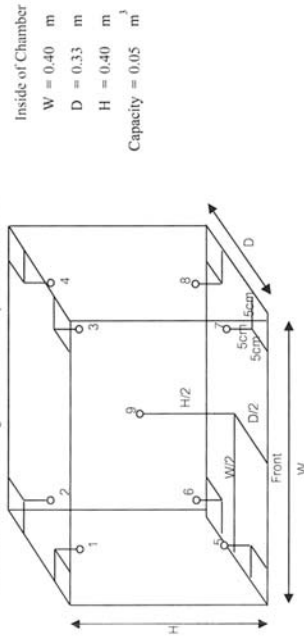
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



| Test Point<br>(°C) | Setting Temperature<br>(°C) | Indicating Temperature<br>(°C) | Measured Temperature (°C) @ Sensor No. |       |       |       |       |       |       |       |       | Uncertainty<br>(± °C) |
|--------------------|-----------------------------|--------------------------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-----------------------|
|                    |                             |                                | 1                                      | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     |                       |
| 104                | 110                         | 110                            | 105.0                                  | 105.0 | 105.0 | 104.9 | 103.9 | 103.9 | 104.2 | 104.2 | 104.2 | 0.94                  |
| 180                | 184                         | 184                            | 180.1                                  | 181.9 | 180.8 | 179.7 | 180.2 | 180.8 | 180.7 | 180.8 | 180.2 | 1.2                   |

| Test Point<br>(°C) | Setting Temperature<br>(°C) | Indicating Temperature<br>(°C) | Measured Uniformity<br>(°C) | Measured Stability<br>(°C) | Overall Variation<br>(°C) |
|--------------------|-----------------------------|--------------------------------|-----------------------------|----------------------------|---------------------------|
| 104                | 110                         | 110                            | 1.0                         | 0.2                        | 1.3                       |
| 180                | 184                         | 184                            | 1.9                         | 0.3                        | 2.7                       |

Remark: The uncertainty is not combine uniformity of the air chamber

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%

-c00-

## Certificate of Calibration

Certificate No. : 67-400505-2

Page : 1 of 2

Submitted by :

M E T Company Limited

36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

Equipment :

Temperature controlled enclosure (Oven)

Manufacturer : Binder

Model : ED53

Range : N/A °C

Resolution : 1 °C

Serial No. : 13-07419

ID No. : MET-OV02/57

Environment :

On site calibration was carried out at the Laboratory, M E T Company Limited

Ambient Temperature : (30.0 to 31.0) °C

Relative Humidity : (50 to 55) %

Line Voltage : (210.0 to 210.8) V

Date of Received : 20 August 2024

Date of Calibration : 20 August 2024

Date of Issue : 21 August 2024

Calibrated by : Pempon Chianpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units  
Standard Digital Thermometer with Thermocouple probe

ID No.

Cert. No.

Due Date

Traceability

400029 &amp; 400030

67-400246-1

25 Oct 2024

National Institute of Metrology Thailand (NIMT)

Approved by

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

Certificate No. : 67-400505-2

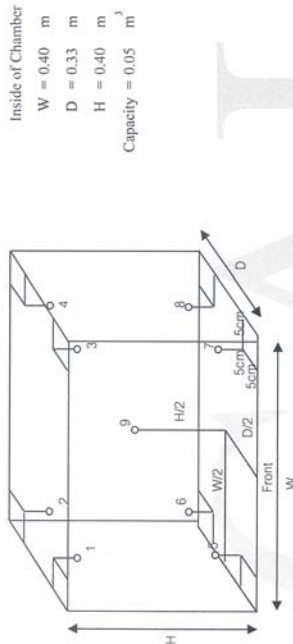
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



| Test Point<br>(°C) | Setting Temperature<br>(°C) | Indicating Temperature<br>(°C) | Measured Temperature (°C) @ Sensor No. |       |       |       |       |       |       |       |       | Uncertainty<br>(± °C) |
|--------------------|-----------------------------|--------------------------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-----------------------|
|                    |                             |                                | 1                                      | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     |                       |
| 104                | 110                         | 110                            | 103.4                                  | 105.0 | 104.8 | 105.0 | 104.1 | 103.8 | 104.2 | 104.4 | 104.2 | 0.96                  |
| 180                | 184                         | 184                            | 179.3                                  | 182.0 | 180.1 | 180.6 | 180.1 | 180.4 | 180.0 | 180.7 | 179.9 | 1.3                   |

| Test Point<br>(°C) | Setting Temperature<br>(°C) | Indicating Temperature<br>(°C) | Measured Uniformity<br>(°C) | Measured Stability<br>(°C) | Overall Variation<br>(°C) |
|--------------------|-----------------------------|--------------------------------|-----------------------------|----------------------------|---------------------------|
| 104                | 110                         | 110                            | 1.1                         | 0.3                        | 2.0                       |
| 180                | 184                         | 184                            | 2.5                         | 0.4                        | 3.3                       |

Remark: The uncertainty is not combine uniformity of the air chamber

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%

- α00 -

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## CERTIFICATE OF COMPLIANCE

JDC Electronic SA Switzerland, Avenue des Sports 42, CH-1400 Yverdon-les-Bains declares under our sole responsibility that the product **FLOWATCH®** and all serial numbers to which this declaration relates, is in conformity with following standards or other normative documents:

89/336/EEC

IEC801-2

CISPR11

Electromagnetic Compatibility and Low Voltage Directive 72/73

The technical construction file is maintained at JDC Electronic SA.



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36/659 Moo 6 Tambol Bangrakpattana Amphur Bangpuatong Nontaburi 11110  
Tel : 0 2920 1458-9 Fax : 0 2920 1460 E-mail : met\_ji@yahoo.com

### TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

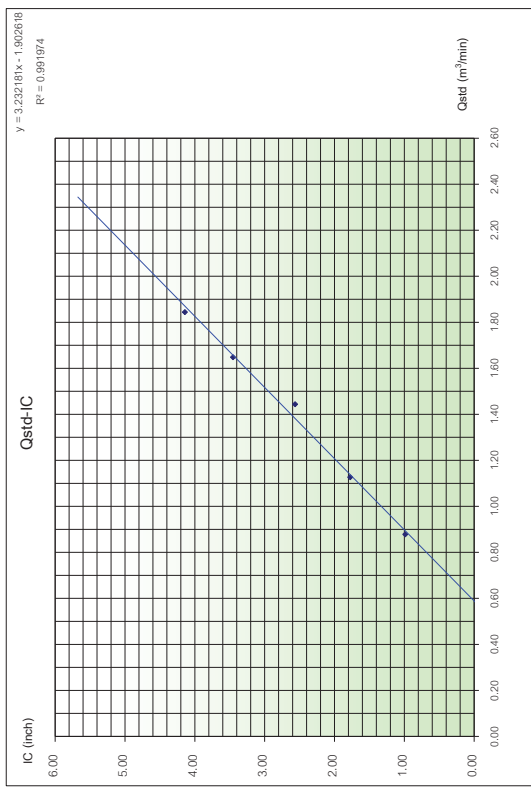
| Sampler Location       |          | Date             |         |
|------------------------|----------|------------------|---------|
| โรงเรียนอัสสัมชัญ      |          | January 16, 2024 |         |
| Sampler Number         | TSP No.2 | Start Time       | 9:05 AM |
| Motor Serial Number    | BL-02    | Stop Time        | 9:10 AM |
| Recorder Serial Number |          | Person           |         |

| Plate No. | (Delta H) |          | (A)                   | (X)                   | (I)                   | (Y)                   | Temperature<br>Pressure<br>Meter | Start<br>Meter |
|-----------|-----------|----------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------------------|----------------|
|           | Positive  | Negative | $\Delta h \cdot 10^3$ | $\Delta h \cdot 10^3$ | $\Delta h \cdot 10^3$ | $\Delta h \cdot 10^3$ |                                  |                |
| 5         | 1.5       | 1.5      | 3.0                   | 1.70988               | 0.87949               | 1.0                   | 0.99                             | 305.0          |
| 7         | 2.4       | 2.5      | 4.9                   | 2.18372               | 1.12676               | 1.8                   | 1.78                             | 305.0          |
| 10        | 4.0       | 4.0      | 8.0                   | 2.70026               | 1.4474                | 2.6                   | 2.46                             | 305.0          |
| 13        | 5.2       | 5.2      | 10.4                  | 3.18138               | 1.64915               | 3.5                   | 3.45                             | 305.0          |
| 18        | 6.5       | 6.5      | 13.0                  | 3.55699               | 1.94440               | 4.2                   | 4.14                             | 305.0          |

|                                      |                             |  |                                 |
|--------------------------------------|-----------------------------|--|---------------------------------|
| Linear Regression Y ON X: Y = mx + b |                             | Average                                |                                 |
| 1                                    | Slope (m)                   | 1.91345                                | Linear Equation                 |
| 2                                    | Intercept (b)               | 0.02773                                | Set Point Flow Rate (X) (m/min) |
| 3                                    | Correlation Coefficient (r) | 0.99935                                | Final Set Flow Rate = (1)       |
| Result                               |                             | Cm(Pa/Pa)^(1/1.5) (m³/min) 0.986505148 |                                 |

COMMENT

Andersen Instruments, Inc.



Calibrated By

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36/659 Moo 6 Tambol Bangrakpattana Amphur Bangpuatong Nontaburi 11110  
Tel : 0 2920 1458-9 Fax : 0 2920 1460 E-mail : met\_ji@yahoo.com

### PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

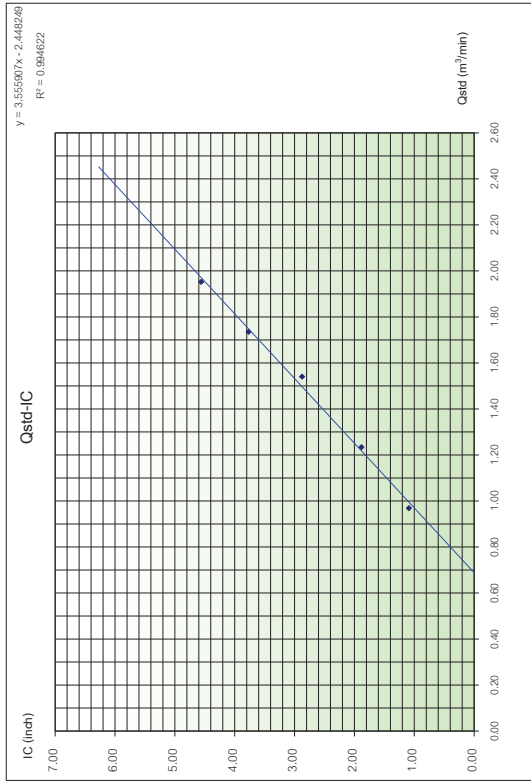
| Sampler Location       |           | Date             |         |
|------------------------|-----------|------------------|---------|
| โรงเรียนอัสสัมชัญ      |           | January 13, 2024 |         |
| Sampler Number         | PM10 No.2 | Start Time       | 1:20 PM |
| Motor Serial Number    | HVL-02    | Stop Time        | 1:25 PM |
| Recorder Serial Number |           | Person           |         |

| Plate No. | (Delta H) |          | (A)                   | (X)                   | (I)                   | (Y)                   | Temperature<br>Pressure<br>Meter | Start<br>Meter |
|-----------|-----------|----------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------------------|----------------|
|           | Positive  | Negative | $\Delta h \cdot 10^3$ | $\Delta h \cdot 10^3$ | $\Delta h \cdot 10^3$ | $\Delta h \cdot 10^3$ |                                  |                |
| 5         | 1.8       | 1.8      | 3.6                   | 1.81905               | 0.90949               | 1.1                   | 1.09                             | 303.0          |
| 7         | 2.0       | 2.0      | 4.0                   | 2.38637               | 1.23771               | 1.9                   | 1.88                             | 303.0          |
| 10        | 4.5       | 4.5      | 9.0                   | 2.97514               | 1.54037               | 2.8                   | 2.86                             | 303.0          |
| 13        | 5.7       | 5.7      | 11.4                  | 3.34841               | 1.73444               | 3.8                   | 3.77                             | 303.0          |
| 18        | 7.2       | 7.2      | 14.4                  | 3.78329               | 1.95227               | 4.6                   | 4.56                             | 303.0          |

|                                      |                             |  |                                 |
|--------------------------------------|-----------------------------|--|---------------------------------|
| Linear Regression Y ON X: Y = mx + b |                             | Average                                |                                 |
| 1                                    | Slope (m)                   | 1.91345                                | Linear Equation                 |
| 2                                    | Intercept (b)               | 0.02773                                | Set Point Flow Rate (X) (m/min) |
| 3                                    | Correlation Coefficient (r) | 0.99935                                | Final Set Flow Rate = (1)       |
| Result                               |                             | Cm(Pa/Pa)^(1/1.5) (m³/min) 0.991714853 |                                 |

COMMENT

Andersen Instruments, Inc.



Calibrated By

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36/659 Moo 6 Tambol Bangkrapattana Amphur Bangkruatong Nontaburi 11110  
Tel : 0 2920 1458-9 Fax : 0 2920 1460 E-mail : met\_j@yahoo.com

### TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

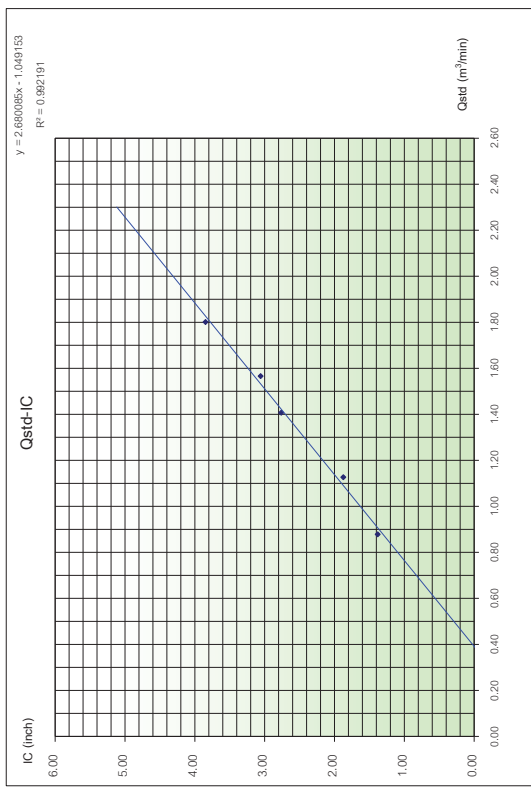
| Sampler Location                |          | Date             |         |
|---------------------------------|----------|------------------|---------|
| ต.บึงกร่ำพัฒนา (ต.บึงกร่ำพัฒนา) |          | January 16, 2024 |         |
| Sampler Number                  | TSP No.1 | Start Time       | 9:00 AM |
|                                 |          | Stop Time        | 9:05 AM |
| Motor Serial Number             |          | Office           |         |
| Recorder Serial Number          |          | TE-5025A         |         |
| Calibrator Serial Number        |          | 1                |         |

| Plate No.   | (Delta H) |     | (A)  | (X)     | (I)     | (Y) | Temperature | Biometric | Start Meter |
|---|-----------|-----|------|---------|---------|-----|-------------|-----------|-------------|
| Pressure Drop Across Orifice (mm H <sub>2</sub> O) $\Delta h_{10} / (P_{atm} \sqrt{T_{atm}/T_{ref}})^{1/2}$ |           |     |      |         |         |     |             |           |             |
| Positive  |           |     |      |         |         |     |             |           |             |
| 5   | 1.5       | 1.5 | 3.0  | 1.70988 | 0.87949 | 1.4 | 1.38        | 305.0     | 757.0       |
| 7   | 2.4       | 2.5 | 4.9  | 2.18372 | 1.12676 | 1.9 | 1.87        | 305.0     | 757.0       |
| 10  | 3.8       | 3.8 | 7.6  | 2.71981 | 1.40682 | 2.8 | 2.76        | 305.0     | 757.0       |
| 13  | 4.7       | 4.7 | 9.4  | 3.02457 | 1.56620 | 3.1 | 3.06        | 305.0     | 757.0       |
| 18  | 6.2       | 6.2 | 12.4 | 3.47384 | 1.80099 | 3.9 | 3.85        | 305.0     | 757.0       |
| Negative  |           |     |      |         |         |     |             |           |             |
| $\Delta h_{10} / (P_{atm} \sqrt{T_{atm}/T_{ref}})^{1/2}$  |           |     |      |         |         |     |             |           |             |
| $Q_{std} = (11m[(h_{10})]^{0.5} / (P_{atm}/P_{std}) \sqrt{T_{atm}/T_{ref}})^{1/2}$                          |           |     |      |         |         |     |             |           |             |
| $(K = C \cdot T^{1/2})$ (mmHg)  |           |     |      |         |         |     |             |           |             |
|   |           |     |      |         |         |     |             |           |             |

|                                      |                             |   |  |                     |  |
|--------------------------------------|-----------------------------|---|--|---------------------|--|
| Linear Regression Y ON X: Y = mx + b |                             | Average                                 |  | 757.0               |  |
| 1                                    | Slope (m)                   | 1.91345 Linear Equation                 |  | 0.992314 psid/mmHg  |  |
| 2                                    | Intercept (b)               | 0.02773 Set Point Flow Rate (X) (m/min) |  | 1.133               |  |
| 3                                    | Correlation Coefficient (r) | 0.99935 Final Set Flow Rate = (1)       |  | (Pa/Pstd) (Tstd/Ta) |  |
| Result                               |                             | C=(Pa/Pstd) (Tstd/Ta)^0.5               |  | 0.996505148         |  |

COMMENT

Andersen Instruments, Inc.



Calibrated By

Approved By



บริษัท เอ็ม อี ที จำกัด MET Company Limited  
36/659 หมู่ 6 ต.บึงกร่ำพัฒนา อ.บึงกร่ำ จ.นนทบุรี 11110  
36/659 Moo 6 Tambol Bangkrapattana Amphur Bangkruatong Nontaburi 11110  
Tel : 0 2920 1458-9 Fax : 0 2920 1460 E-mail : met\_j@yahoo.com

### PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

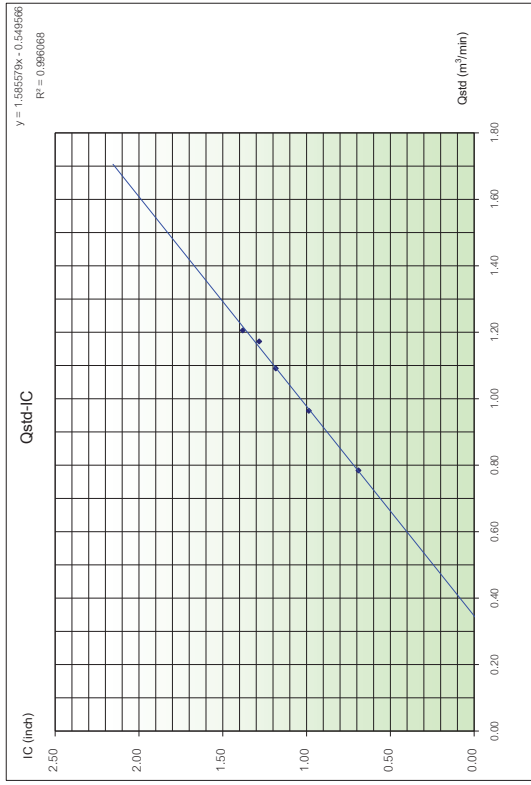
| Sampler Location                |           | Date                     |                  |
|---------------------------------|-----------|--------------------------|------------------|
| ต.บึงกร่ำพัฒนา (ต.บึงกร่ำพัฒนา) |           | Start Time               | January 13, 2024 |
| Sampler Number                  | PM10 No.1 | Stop Time                | 1:15 PM          |
| Motor Serial Number             | PM1-01    |                          | 1:20 PM          |
| Recorder Serial Number          | -         | Calibrator Model         | TE-5025A         |
|                                 |           | Calibrator Serial Number | 1                |

| Plate No. | (Delta H)                         |                 | (A)  | (X)     | (I)  | (Y) | Temperature                     | Biometric | Start                          | Stop |
|-----------|-----------------------------------|-----------------|--|---------|--|-----|---------------------------------|-----------|--------------------------------|------|
|           | Pressure Drop Across Orifice (Pa) |                 |  |         |  |     |                                 |           |                                |      |
| Positive  |                                   | $\Delta h_{10}$ | $(\Delta h_{10}/P_{atm}) \sqrt{T_{atm}/T_{ref}}$ |         | $Q_{std} = (11m[(h_{10})]^{0.5} / (P_{atm}/P_{std}) \sqrt{T_{atm}/T_{ref}})^{1/2}$ |     | $C = [(P_{atm}/T_{atm})^{0.5}]$ |           | $(K = C \cdot T^{1/2})$ (mmHg) |      |
| 5         | 1.2                               | 1.2             | 2.4  | 1.52890 | 0.78422  | 0.7 | 0.69                            | 305.0     | 757.0                          |      |
| 7         | 1.8                               | 1.8             | 3.6  | 1.87176 | 0.98372  | 1.0 | 0.89                            | 305.0     | 757.0                          |      |
| 10        | 2.3                               | 2.3             | 4.6  | 2.11562 | 1.09127  | 1.2 | 1.18                            | 305.0     | 757.0                          |      |
| 13        | 2.6                               | 2.7             | 5.3  | 2.27111 | 1.17242  | 1.3 | 1.28                            | 305.0     | 757.0                          |      |
| 18        | 2.6                               | 2.6             | 5.6  | 2.33450 | 1.20555  | 1.4 | 1.38                            | 305.0     | 757.0                          |      |

|                                      |                             |   |  |                     |  |
|--------------------------------------|-----------------------------|---|--|---------------------|--|
| Linear Regression Y ON X: Y = mx + b |                             | Average                                 |  | 757.0               |  |
| 1                                    | Slope (m)                   | 1.91345 Linear Equation                 |  | 0.997149 psid/mmHg  |  |
| 2                                    | Intercept (b)               | 0.02773 Set Point Flow Rate (X) (m/min) |  | 1.133               |  |
| 3                                    | Correlation Coefficient (r) | 0.99935 Final Set Flow Rate = (1)       |  | (Pa/Pstd) (Tstd/Ta) |  |
| Result                               |                             | C=(Pa/Pstd) (Tstd/Ta)^0.5               |  | 0.996505148         |  |

COMMENT

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Calibrated By

Approved By



บริษัท เอ็นไอร์ เซอร์วิส จำกัด

42 รามอินทรา 14 แยก 9 แขวงท่าแร้ง เขตบางเขน กรุงเทพฯ 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201  
บริษัท เอ็นไอร์ เซอร์วิส จำกัด 42 รามอินทรา 14 แยก 9, The Rang, Bangkok, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201  
ENVIAIR SERVICE CO.,LTD.

Analyzer Performance Test

Calibrated Date: 5 January

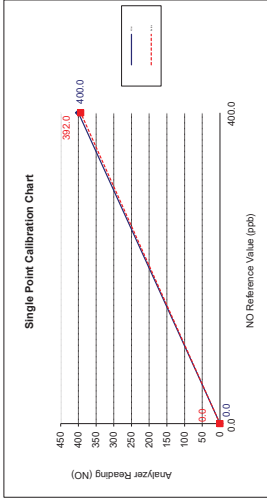
| 2024 Instruments Information       |                       |
|------------------------------------|-----------------------|
| Analyzer Type: NO/NO2/NOx Analyzer | Manufacturer: ECOTECH |
| Model: Serinus 40                  | S/N: 12-1001          |

| Calibration System               |                           |
|----------------------------------|---------------------------|
| Calibrator Unit                  | Standard Gas              |
| Dilutor Model Deshi Model 5008   | NO Conc 55.17 PPM         |
| S/N: 705                         | SO2 Conc 55.11 PPM        |
| ZERO AIR Generator API Model 701 | CO Conc 4.535 PPM         |
| S/N: 1924                        | Cylinder number EB0129027 |
| Expire Date: 29 Oct. 2027        |                           |

Environment: Temperature 25.5 °C Humidity 51 %RH

| Calibration Check ( Before adjust ) |                     |                      |             |                     |                      |
|-------------------------------------|---------------------|----------------------|-------------|---------------------|----------------------|
| Zero                                |                     |                      | Span        |                     |                      |
| GAS                                 | Reading Value (ppb) | Expected Value (ppb) | Drift (ppb) | Reading Value (ppb) | Expected Value (ppb) |
| NO                                  | 0.0                 | 0.0                  | 0.0         | 392.0               | 400.0                |
| NOx                                 | 0.0                 | 1.0                  | 1.0         | 400.0               | 400.0                |

| Calibration Check ( After adjust ) |                     |                      |             |                     |                      |
|------------------------------------|---------------------|----------------------|-------------|---------------------|----------------------|
| Zero                               |                     |                      | Span        |                     |                      |
| GAS                                | Reading Value (ppb) | Expected Value (ppb) | Drift (ppb) | Reading Value (ppb) | Expected Value (ppb) |
| NO                                 | 0.0                 | 0.0                  | 0.0         | 400.0               | 400.0                |
| NOx                                | 0.0                 | 0.0                  | 0.0         | 400.0               | 400.0                |



Calibrate By :



บริษัท เอ็นไอร์ เซอร์วิส จำกัด

42 รามอินทรา 14 แยก 9 แขวงท่าแร้ง เขตบางเขน กรุงเทพฯ 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201  
บริษัท เอ็นไอร์ เซอร์วิส จำกัด 42 รามอินทรา 14 แยก 9, The Rang, Bangkok, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201  
ENVIAIR SERVICE CO.,LTD.

Analyzer Performance Test

Calibrated Date: 5 April 2024

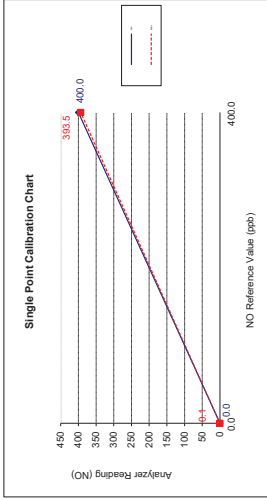
| Instruments Information            |                                    |
|------------------------------------|------------------------------------|
| Analyzer Type: NO/NO2/NOx Analyzer | Manufacturer: Thermo Environmental |
| Model: 42C                         | S/N: 42C-501114783                 |

| Calibration System               |                           |
|----------------------------------|---------------------------|
| Calibrator Unit                  | Standard Gas              |
| Dilutor Model Deshi Model 5008   | NO Conc 55.17 PPM         |
| S/N: 705                         | SO2 Conc 55.11 PPM        |
| ZERO AIR Generator API Model 701 | CO Conc 4.535 PPM         |
| S/N: 1924                        | Cylinder number EB0129027 |
| Expire Date: 29 Oct. 2027        |                           |

Environment: Temperature 25.5 °C Humidity 51 %RH

| Calibration Check ( Before adjust ) |                     |                      |             |                     |                      |
|-------------------------------------|---------------------|----------------------|-------------|---------------------|----------------------|
| Zero                                |                     |                      | Span        |                     |                      |
| GAS                                 | Reading Value (ppb) | Expected Value (ppb) | Drift (ppb) | Reading Value (ppb) | Expected Value (ppb) |
| NO                                  | 0.1                 | 0.0                  | 0.1         | 393.5               | 400.0                |
| NOx                                 | 0.1                 | 0.0                  | 0.1         | 396.2               | 400.0                |

| Calibration Check ( After adjust ) |                     |                      |             |                     |                      |
|------------------------------------|---------------------|----------------------|-------------|---------------------|----------------------|
| Zero                               |                     |                      | Span        |                     |                      |
| GAS                                | Reading Value (ppb) | Expected Value (ppb) | Drift (ppb) | Reading Value (ppb) | Expected Value (ppb) |
| NO                                 | 0.0                 | 0.0                  | 0.0         | 400.0               | 400.0                |
| NOx                                | 0.0                 | 0.0                  | 0.0         | 400.0               | 400.0                |



Calibrate By :





CERTIFICATE OF CALIBRATION

NO. 20231215111

|                      |                   |
|----------------------|-------------------|
| Name of Product:     | Sound Level Meter |
| Model                | ST-2TD            |
| Serial Number:       | 820791            |
| Specification:       | Class 2           |
| Conclusion:          | Pass              |
| Date of calibration: | 2023-12-14        |
| Due Date:            | 2024-12-13        |



Cal

- I. This report certifies that all calibration equipment used in the test is traceable with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surplus then, and applies only to the unit identified above.
- II. This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- III. This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlet Tech Co Ltd Taiwan.

1. Preliminary inspection: OK
2. Type & serial No. of Microphone: AN64421A-000278
3. Adjustments to indicated sound levels:

Type of Calibrator: B&K 4221  
Sound Pressure Level: 94.0 dB

4. Measuring up limit: 138 dB

5. Frequency weightings (Acoustic signal tests for Z weighting, other electric signal tests.)

Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB

| Nominal frequency /Hz | Frequency weighting / dB |      |      | Nominal frequency /Hz | Frequency weighting / dB |       |     |
|-----------------------|--------------------------|------|------|-----------------------|--------------------------|-------|-----|
|                       | A                        | C    | Z    |                       | A                        | C     | Z   |
| 20                    | -50.4                    | -6.1 | -0.2 | 1000                  | 0.1                      | 0.0   | 0.0 |
| 31.5                  | -39.4                    | -2.9 | 0.0  | 2000                  | 1.3                      | -0.1  | 0.0 |
| 63                    | -24.2                    | -0.8 | 0.0  | 4000                  | 1.3                      | -0.6  | 0.0 |
| 125                   | -16.1                    | -0.1 | 0.0  | 8000                  | -1.1                     | -3.1  | 0.1 |
| 250                   | -8.6                     | 0.0  | 0.1  | 12500                 | -11.0                    | -13.0 | 0.0 |
| 500                   | -3.2                     | 0.0  | 0.0  | /                     | /                        | /     | /   |

6. Self-generated noise
- Microphone replaced by electrical input signal device

|            |            |            |
|------------|------------|------------|
| 25.1 dB(A) | 26.3 dB(C) | 34.9 dB(Z) |
|------------|------------|------------|

7. FRS Weighting

|  |      |
|--|------|
| Rate of the F weighting decrease ( dB/s) | 34.6 |
| Rate of the S weighting decrease ( dB/s) | 4.3  |
| Deviation of FRS                         | -0.1 |

8. Level Linearity (A-weighting at frequency 1 kHz)

Reference sound level 90.0 dB  
Max error at 10dB steps upper reference sound level 0.1 dB  
Max error at 10dB steps within 5dB of the upper limit linear operating range 0.0 dB  
Max error at 10dB steps below reference sound level 0.1 dB  
Max error at 10dB steps within 5dB upper the lower limit linear operating range 0.1 dB

9. Tone burst response ( A Weighting ) :

| Single Toneburst duration /ms | Toneburst response /dB |           |                |
|-------------------------------|------------------------|-----------|----------------|
|                               | LAFmax-LA              | LASmax-LA | LAE-LA LAeq-LA |
| 500                           | 0.0                    | -4.0      | -2.9 -7.0      |
| 200                           | -1.0                   | -16.9     | -6.9 -7.0      |
| 2                             | -18.2                  | -26.9     | -26.9 -7.0     |
| 0.25                          | -27.1                  | /         | -36.1 -7.0     |

10. Peak C sound level ( 500Hz ) :

| Cycle         | One cycle | nominal value | Positive half | nominal value | Negative half | nominal value |
|---------------|-----------|---------------|---------------|---------------|---------------|---------------|
| LPpeak-LC(dB) | 3.4       | 3.5           | 2.3           | 2.4           | 2.3           | 2.4           |

11. Overload indication: \_Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level 123.0 dB  
Sweep amplitude 40 dB  
Scan cycle time 60 S; Measurement period 180 S

| Items             | Measured value/dB | Theoretical calculated value/dB | Error/dB |
|-------------------|-------------------|---------------------------------|----------|
| L <sub>eq,T</sub> | 113.3             | 113.4                           | -0.1     |
| L <sub>5</sub>    | 121.0             | 121.0                           | 0.0      |
| L <sub>10</sub>   | 119.0             | 119.0                           | 0.0      |
| L <sub>50</sub>   | 103.0             | 103.0                           | 0.0      |
| L <sub>90</sub>   | 87.1              | 87.0                            | 0.1      |
| L <sub>95</sub>   | 85.1              | 85.0                            | 0.1      |

Uncertainty of measurement results\_0.4 dB(k=2)

Environment conditions:

Air temperature: 20 °C  
Relative humidity: 50 %  
Static pressure: 101.8 kPa

Test specifications:

- All Scartlet's Sound Level Meter has been calibrated in accordance with the requirements as specified in ISO 17025 and the lab calibration procedure SMP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responses of the Sound Level Meter.

References:

IEC 61672-3 Sound Level Meters Part 3: Periodic tests



CERTIFICATE OF CALIBRATION

NO. 20231215112

|                      |                   |
|----------------------|-------------------|
| Name of Product:     | Sound Level Meter |
| Model:               | ST-21D            |
| Serial Number:       | 820792            |
| Specification:       | Class 2           |
| Conclusion:          | Pass              |
| Date of calibration: | 2023-12-14        |
| Due Date:            | 2024-12-13        |

Calibrator

- This report certifies that all calibration equipment used in the test is traceable with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpasses then, and applies only to the unit identified above.
- This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- This certificate of calibration shall not be reproduced except in full, without written permission of the Scartlet Tech Co Ltd Taiwan.

- Preliminary inspection: OK
- Type & serial No. of Microphone: ANA14421A-000433
- Adjustments to indicated sound levels:  
Type of Calibrator: B&K 4221  
Sound Pressure Level: 94.0 dB
- Measuring up limit: 138 dB
- Frequency weightings (Acoustic signal tests for Z weighting, other electric signal tests.)

Equivalent Free-field Sound Level (reference environment conditions) 92.8 dB

| Nominal frequency /Hz | Frequency weighting / dB |      |      | Nominal frequency /Hz | Frequency weighting / dB |       |     |
|-----------------------|--------------------------|------|------|-----------------------|--------------------------|-------|-----|
|                       | A                        | C    | Z    |                       | A                        | C     | Z   |
| 20                    | -50.6                    | -6.3 | -0.3 | 1000                  | 0.1                      | 0.0   | 0.0 |
| 31.5                  | -39.5                    | -3.0 | -0.1 | 2000                  | 1.3                      | -0.1  | 0.0 |
| 63                    | -26.2                    | -0.9 | 0.0  | 4000                  | 1.3                      | -0.6  | 0.0 |
| 125                   | -16.2                    | -0.2 | 0.0  | 8000                  | -1.2                     | -3.2  | 0.1 |
| 250                   | -8.6                     | 0.0  | 0.1  | 12500                 | -11.0                    | -13.0 | 0.0 |
| 500                   | -3.2                     | 0.0  | 0.0  | /                     | /                        | /     | /   |

6. Self-generated noise

Microphone replaced by electrical input signal device

|            |            |            |
|------------|------------|------------|
| 25.2 dB(A) | 26.0 dB(C) | 34.3 dB(Z) |
|------------|------------|------------|

7. FRS Weighting

|   |      |
|---|------|
| Rate of the F weighting decrease ( dB/s ) | 35.2 |
| Rate of the S weighting decrease (dB/s)   | 4.4  |
| Deviation of FRS                          | 0.0  |

8. Level Linearity (A-weighting at frequency 1 kHz)

Reference sound level 90.0 dB  
Max error at 10dB steps upper reference sound level 0.1 dB  
Max error at 1dB steps within 5dB of the upper limit linear operating range 0.0 dB  
Max error at 10dB steps below reference sound level 0.1 dB  
Max error at 1dB steps within 5dB upper the lower limit linear operating range 0.1 dB

9. Tone burst response ( A Weighting ) :

| Single Toneburst duration /ms | Toneburst response /dB |           |        |
|-------------------------------|------------------------|-----------|--------|
|                               | LAFmax-LA              | LASmax-LA | LAE-LA |
| 500                           | 0.0                    | -4.0      | -2.9   |
| 200                           | -1.0                   | -7.4      | -6.9   |
| 2                             | -18.2                  | -26.9     | -26.9  |
| 0.25                          | -27.3                  | /         | -36.1  |

10. Peak C sound level ( 500Hz ) :

| Cycle         | One cycle | nominal value | Positive half | nominal value | Negative half | nominal value |
|---------------|-----------|---------------|---------------|---------------|---------------|---------------|
| L0peak-L0(dB) | 3.5       | 3.5           | 2.3           | 2.4           | 2.3           | 2.4           |

11. Overload indication: Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level: 123.0 dB  
Sweep amplitude: 40 dB  
Scan cycle time: 60 S; Measurement period: 180 S.

| Items              | Measured value/dB | Theoretical calculated value/dB | Error/dB |
|--------------------|-------------------|---------------------------------|----------|
| L <sub>Aeq,T</sub> | 113.3             | 113.4                           | -0.1     |
| L <sub>S</sub>     | 121.0             | 121.0                           | 0.0      |
| L <sub>10</sub>    | 119.0             | 119.0                           | 0.0      |
| L <sub>50</sub>    | 103.0             | 103.0                           | 0.0      |
| L <sub>90</sub>    | 87.1              | 87.0                            | 0.1      |
| L <sub>95</sub>    | 85.1              | 85.0                            | 0.1      |

Uncertainty of measurement results: 0.4 dB (k=2)

Environment conditions:

Air temperature: 20 °C  
Relative humidity: 50 %  
Static pressure: 101.8 kPa

Test specifications:

- All Scairet's Sound Level Meter has been calibrated in accordance with the requirements as specified in ISO 17025 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responses of the Sound Level Meter.

References:

IEC 61672-3 Sound Level Meters Part 3: Periodic tests





CERTIFICATE OF CALIBRATION

NO. 2023121513

|                      |                   |
|----------------------|-------------------|
| Name of Product:     | Sound Level Meter |
| Model                | ST-2TD            |
| Serial Number:       | 820793            |
| Specification:       | Class 2           |
| Conclusion:          | Pass              |
| Date of calibration: | 2023-12-14        |
| Due Date:            | 2024-12-13        |



Cal

- I. This report certifies that all calibration equipment used in the test is traceable with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surplus then, and applies only to the unit identified above.
- II. This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- III. This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlet Tech Co Ltd Taiwan.

1. Preliminary inspection: OK
2. Type & serial No. of Microphone: AN64421A-00462
3. Adjustments to indicated sound levels:

Type of Calibrator: B&K 4231  
Sound Pressure Level: 94.0 dB

4. Measuring up limit: 138 dB

5. Frequency weightings (Acoustic signal tests for Z weighting, other electric signal tests.)

Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB

| Nominal frequency /Hz | Frequency weighting / dB |      |      | Nominal frequency /Hz | Frequency weighting / dB |       |     |
|-----------------------|--------------------------|------|------|-----------------------|--------------------------|-------|-----|
|                       | A                        | C    | Z    |                       | A                        | C     | Z   |
| 20                    | -50.4                    | -6.4 | -0.2 | 1000                  | 0.1                      | 0.0   | 0.0 |
| 31.5                  | -39.6                    | -3.1 | -0.2 | 2000                  | 1.3                      | -0.1  | 0.0 |
| 63                    | -24.2                    | -0.8 | 0.0  | 4000                  | 1.3                      | -0.6  | 0.0 |
| 125                   | -14.2                    | -0.3 | 0.0  | 8000                  | -1.2                     | -3.2  | 0.1 |
| 250                   | -8.6                     | 0.0  | 0.1  | 12500                 | -11.0                    | -13.0 | 0.0 |
| 500                   | -3.2                     | 0.0  | 0.0  | /                     | /                        | /     | /   |

6. Self-generated noise
- Microphone replaced by electrical input signal device

|            |            |            |
|------------|------------|------------|
| 24.8 dB(A) | 25.6 dB(C) | 34.4 dB(Z) |
|------------|------------|------------|

7. FRS Weighting

|  |      |
|--|------|
| Rate of the F weighting decrease ( dB/s) | 35.2 |
| Rate of the S weighting decrease ( dB/s) | 4.4  |
| Deviation of FRS                         | -0.1 |

8. Level Linearity (A-weighting at frequency 1 kHz)

- Reference sound level 90.0 dB
- Max error at 10dB steps upper reference sound level 0.1 dB
- Max error at 10dB steps within 5dB of the upper limit linear operating range 0.0 dB
- Max error at 10dB steps below reference sound level 0.1 dB
- Max error at 10dB steps within 5dB upper the lower limit linear operating range 0.1 dB

9. Tone burst response (A Weighting) :

| Single Toneburst duration /ms | Toneburst response /dB |           |                |
|-------------------------------|------------------------|-----------|----------------|
|                               | LAFmax-LA              | LASmax-LA | LAE-LA LAeq-LA |
| 500                           | 0.0                    | -4.0      | -2.9 -7.0      |
| 200                           | -1.0                   | -7.4      | -6.9 -7.0      |
| 2                             | -18.2                  | -26.9     | -26.9 -7.0     |
| 0.25                          | -27.2                  | /         | -36.1 -7.0     |

10. Peak C sound level (500Hz) :

| Cycle        | One cycle | nominal value | Positive half | nominal value | Negative half | nominal value |
|--------------|-----------|---------------|---------------|---------------|---------------|---------------|
| LPeak-LC(dB) | 3.5       | 3.5           | 2.3           | 2.4           | 2.3           | 2.4           |

11. Overload indication: Pass

12. Statistical analysis function

- Sweep signal maximum indicated sound level 123.0 dB
- Sweep amplitude 40 dB
- Scan cycle time 60 S; Measurement period 180 S

## Calibration & Test Certificate

We hereby certify that the instrument under mentioned has been certainly calibrated according to our calibration standard and the testing result in the calibration procedure has been good enough within the tolerance regulated in our specification.

### Test conditions

Model name ..... Noise Dosimeter  
Model number ..... ST-130  
Serial number ..... 2306000019  
Temperature ..... 25.0° C  
Humidity ..... 77.0%rh  
Date of calibration ..... 2023/09/08  
Valid Until ..... 2024/09/07

### Test data

| Test item | Range              | Results |
|-----------|--------------------|---------|
| M dBA     | Range: 30...130 dB | PASS    |
| M dBC     | Range: 30...130 dB | PASS    |
| M dBZ     | Range: 30...130 dB | PASS    |

### Calibrator

| Model                      | Model number | Serial number | Due date    |
|----------------------------|--------------|---------------|-------------|
| Standard SOUND LEVEL METER | B&K 2239     | 2449143       | OCT/22/2024 |

The standard generators used for calibration procedure are proofed once a year and can be traceable to the standard authorized by public organization.

Approve

| Items              | Measured value/dB | Theoretical calculated value/dB | Error/dB |
|--------------------|-------------------|---------------------------------|----------|
| L <sub>Aeq,T</sub> | 113.3             | 113.4                           | -0.1     |
| L <sub>5</sub>     | 121.0             | 121.0                           | 0.0      |
| L <sub>10</sub>    | 119.0             | 119.0                           | 0.0      |
| L <sub>50</sub>    | 103.0             | 103.0                           | 0.0      |
| L <sub>90</sub>    | 87.1              | 87.0                            | 0.1      |
| L <sub>95</sub>    | 85.1              | 85.0                            | 0.1      |

Uncertainty of measurement results: 0.4 dB(k=2)

### Environment conditions:

Air temperature: 20 °C  
Relative humidity: 50 %  
Static pressure: 101.8 kPa

### Test specifications:

- All Scarlet's Sound Level Meter has been calibrated in accordance with the requirements as specified in ISO 17025 and the lab calibration procedure SMT004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responses of the Sound Level Meter.

### References:

IEC 61672-3 Sound Level Meters Part 3: Periodic tests



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Calibration Laboratory  
3519

## Calibration & Test Certificate

We hereby certify that the instrument under mentioned has been certainly calibrated according to our calibration standard and the testing result in the calibration procedure has been good enough within the tolerance regulated in our specification.

### Test conditions

Model name ..... Noise Dosimeter  
Model number ..... ST-130  
Serial number ..... 230600020  
Temperature ..... 25.0° C  
Humidity ..... 77.0%rh  
Date of calibration ..... 2023/09/08  
Valid Until ..... 2024/09/07

### Test data

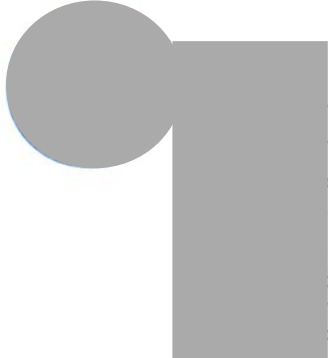
| Test Item | Range              | Results |
|-----------|--------------------|---------|
| M dBA     | Range: 30...130 dB | PASS    |
| M dBC     | Range: 30...130 dB | PASS    |
| M dBZ     | Range: 30...130 dB | PASS    |

### Calibrator

| Model                      | Model number | Serial number | Due date    |
|----------------------------|--------------|---------------|-------------|
| Standard SOUND LEVEL METER | B&K 2239     | 2449143       | OCT/22/2024 |

The standard generators used for calibration procedure are proofed once a year and can be traceable to the standard authorized by public organization.

Approved by



Head of Engineering Department



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Calibration Laboratory  
3519

## Calibration & Test Certificate

We hereby certify that the instrument under mentioned has been certainly calibrated according to our calibration standard and the testing result in the calibration procedure has been good enough within the tolerance regulated in our specification.

### Test conditions

Model name ..... Noise Dosimeter  
Model number ..... ST-130  
Serial number ..... 230600121  
Temperature ..... 22.0° C  
Humidity ..... 70.0%rh  
Date of calibration ..... 2023/10/18  
Valid Until ..... 2024/10/17

### Test data

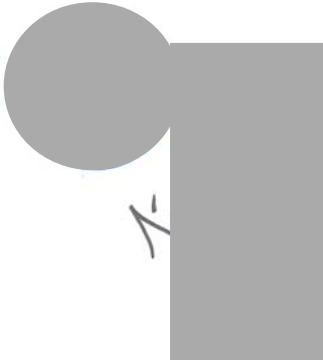
| Test Item | Range              | Results |
|-----------|--------------------|---------|
| M dBA     | Range: 30...130 dB | PASS    |
| M dBC     | Range: 30...130 dB | PASS    |
| M dBZ     | Range: 30...130 dB | PASS    |

### Calibrator

| Model                      | Model number | Serial number | Due date    |
|----------------------------|--------------|---------------|-------------|
| Standard SOUND LEVEL METER | B&K 2239     | 2449143       | OCT/22/2024 |

The standard generators used for calibration procedure are proofed once a year and can be traceable to the standard authorized by public organization.

Approved by



Head of Engineering Department

## Calibration & Test Certificate

We hereby certify that the instrument under mentioned has been certainly calibrated according to our calibration standard and the testing result in the calibration procedure has been good enough within the tolerance regulated in our specification.

### Test conditions

Model name ..... Noise Dosimeter  
Model number ..... ST-130  
Serial number ..... 230600122  
Temperature ..... 22.0° C  
Humidity ..... 70.0%rh  
Date of calibration ..... 2023/10/18  
Valid Until ..... 2024/10/17

### Test data

| Test item | Range              | Results |
|-----------|--------------------|---------|
| M dBA     | Range: 30...130 dB | PASS    |
| M dBC     | Range: 30...130 dB | PASS    |
| M dBZ     | Range: 30...130 dB | PASS    |

### Calibrator

| Model                      | Model number | Serial number | Due date    |
|----------------------------|--------------|---------------|-------------|
| Standard SOUND LEVEL METER | B&K 2239     | 2449143       | OCT/22/2024 |

The standard generators used for calibration procedure are proofed once a year and can be traceable to the standard authorized by public organization.

Approved