

# ภาคผนวกที่ 5

## เอกสารการสอบเทียบเครื่องมือ

- |        |     |                                                                                             |
|--------|-----|---------------------------------------------------------------------------------------------|
| เอกสาร | 5-1 | เอกสารสอบเทียบเครื่องมือการตรวจวัดคุณภาพอากาศในบรรยากาศ                                     |
| เอกสาร | 5-2 | เอกสารสอบเทียบเครื่องมือการตรวจวัดคุณภาพอากาศจากปล่อง                                       |
| เอกสาร | 5-3 | เอกสารสอบเทียบเครื่องมือการตรวจคุณภาพอากาศในสถานประกอบการ<br>(Working Area)                 |
| เอกสาร | 5-4 | เอกสารสอบเทียบเครื่องมือการตรวจระดับเสียงโดยทั่วไปและเสียงในสถานประกอบการ<br>(Working Area) |
| เอกสาร | 5-5 | เอกสารสอบเทียบเครื่องมือการตรวจค่าความร้อนในสถานประกอบการ<br>(Working Area)                 |

**ตารางสรุปรายการเอกสารการสอบเทียบความถูกต้องของเครื่องมือเก็บตัวอย่าง  
และเครื่องมือตรวจวิเคราะห์**

| รายการตรวจวัด                                                                                | เครื่องมือเก็บตัวอย่าง                                                                         | เครื่องมือตรวจวิเคราะห์                      |
|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|----------------------------------------------|
| 1. คุณภาพอากาศในบรรยากาศ                                                                     |                                                                                                |                                              |
| ▪ TSP                                                                                        | ▪ High Volume Air Sampler<br>No. B32, B40, B44                                                 | ▪ Digital Balance                            |
| ▪ PM <sub>10</sub>                                                                           | ▪ High Volume PM-10 Air Sampler<br>No. B01, B02, B21                                           | ▪ Digital Balance                            |
| ▪ SO <sub>2</sub>                                                                            | ▪ Gas Sampler Box No. B02, B05, B14                                                            | ▪ Spectrophotometer                          |
| ▪ NO <sub>2</sub>                                                                            | ▪ NO <sub>2</sub> Analyzer No. B07, B09, B19                                                   | ▪ NO <sub>2</sub> Analyzer No. B07, B09, B19 |
| 2. ระดับเสียงโดยทั่วไป                                                                       |                                                                                                |                                              |
| ▪ L <sub>eq</sub> 1 hr<br>▪ L <sub>eq</sub> 24 hr<br>▪ L <sub>max</sub><br>▪ L <sub>90</sub> | ▪ Acoustic Calibrator<br>Sound Level Meter No. ACO-B05, B23,<br>B42, R46, R54, R56, NL 21-B01  | -                                            |
| 3. คุณภาพอากาศจากปล่องระบาย                                                                  |                                                                                                |                                              |
| ▪ TSP                                                                                        | ▪ Console No. B04<br>▪ Pitot Tube No. B18                                                      | ▪ Digital Balance                            |
| ▪ SO <sub>2</sub>                                                                            | ▪ Personal Pump SKC No. B17<br>▪ Rotameter No. H-B09                                           | -                                            |
| ▪ NO <sub>x</sub>                                                                            | ▪ Vacuum Gauge                                                                                 | ▪ Spectrophotometer                          |
| 4. คุณภาพอากาศ<br>ในสถานประกอบการ                                                            |                                                                                                |                                              |
| ▪ Total Dust                                                                                 | ▪ Personal Pump SKC No. B57, B71, B78,<br>B80, B93<br>▪ Rotameter No. H-B06                    | ▪ Digital Balance                            |
| 5. ระดับเสียงในสถานประกอบการ                                                                 |                                                                                                |                                              |
| ▪ L <sub>eq</sub> 8 hr                                                                       | ▪ Acoustic Calibrator<br>Sound Level Meter<br>No. ST-C1-B06, B07, B08<br>No. ACO-B44, B45, B46 | -                                            |
| 6. ความร้อนในสถานประกอบการ                                                                   |                                                                                                |                                              |
| ▪ WBGT                                                                                       | ▪ Digital Thermometer with Probe<br>No. B12, B17, B31, B32                                     | -                                            |

## เอกสารที่ 5-1

เอกสารสอบเทียบเครื่องมือการตรวจวัดคุณภาพอากาศในบรรยากาศ



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### High Volume Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard      Model : TE 5025A      S/N : 3611

#### Calibration Data

| High Volume Air Sampler Data |            | Calibration Data |                                        |                |
|------------------------------|------------|------------------|----------------------------------------|----------------|
| Recorder No.                 | Blower No. | Date             | Actual Flowrate (ft <sup>3</sup> /min) | R <sup>2</sup> |
| B01                          | B01        | 02/02/2026       | y = 1.147x-3.983                       | 0.998          |
| B02                          | B02        | 02/02/2026       | y = 1.158x-3.531                       | 0.997          |
| B03                          | B03        | 02/02/2026       | y = 1.109x-2.595                       | 0.999          |
| B04                          | B04        | 02/02/2026       | y = 1.123x-1.928                       | 0.998          |
| B05                          | B05        | 02/02/2026       | y = 1.145x-3.659                       | 0.999          |
| B06                          | B06        | 02/02/2026       | y = 1.100x-2.379                       | 0.999          |
| B07                          | B07        | 02/02/2026       | y = 1.122x-2.377                       | 0.999          |
| B08                          | B08        | 02/02/2026       | y = 1.102x-2.500                       | 0.998          |
| B09                          | B09        | 02/02/2026       | y = 1.121x-3.479                       | 0.999          |
| B10                          | B10        | 02/02/2026       | y = 1.143x-3.199                       | 0.996          |
| B11                          | B11        | 03/02/2026       | y = 1.105x-1.251                       | 0.999          |
| B12                          | B12        | 03/02/2026       | y = 1.136x-3.106                       | 0.996          |
| B13                          | B13        | 03/02/2026       | y = 1.142x-2.536                       | 0.998          |
| B14                          | B14        | 03/02/2026       | y = 1.135x-3.133                       | 0.998          |
| B15                          | B15        | 03/02/2026       | y = 1.111x-2.932                       | 0.998          |
| B16                          | B16        | 04/02/2026       | y = 1.104x-3.794                       | 0.998          |
| B17                          | B17        | 04/02/2026       | y = 1.151x-2.773                       | 0.998          |
| B18                          | B18        | 04/02/2026       | y = 1.140x-2.730                       | 0.998          |
| B19                          | B19        | 04/02/2026       | y = 1.137x-2.624                       | 0.998          |
| B20                          | B20        | 04/02/2026       | y = 1.139x-1.402                       | 0.998          |
| B21                          | B21        | 04/02/2026       | y = 1.131x-1.657                       | 0.999          |
| B22                          | B22        | 04/02/2026       | y = 1.166x-3.887                       | 0.997          |
| B23                          | B23        | 04/02/2026       | y = 1.162x-4.278                       | 0.998          |
| B24                          | B24        | 04/02/2026       | y = 1.128x-2.436                       | 0.998          |
| B25                          | B25        | 04/02/2026       | y = 1.159x-4.833                       | 0.998          |
| B26                          | B26        | 03/02/2026       | y = 1.103x-1.969                       | 0.997          |
| B27                          | B27        | 04/02/2026       | y = 1.149x-3.761                       | 0.997          |
| B28                          | B28        | 04/02/2026       | y = 1.134x-3.377                       | 0.999          |
| B29                          | B29        | 04/02/2026       | y = 1.118x-2.903                       | 0.997          |
| B30                          | B30        | 04/02/2026       | y = 1.157x-2.504                       | 0.999          |
| B31                          | B31        | 04/02/2026       | y = 1.165x-3.108                       | 0.999          |
| B32                          | B32        | 04/02/2026       | y = 1.113x-2.480                       | 0.999          |
| B33                          | B33        | 04/02/2026       | y = 1.155x-2.774                       | 0.997          |
| B34                          | B34        | 04/02/2026       | y = 1.125x-1.905                       | 0.997          |



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### High Volume Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard      Model : TE 5025A      S/N : 3611

#### Calibration Data

| High Volume Air Sampler Data |            | Calibration Data |                                        |                |
|------------------------------|------------|------------------|----------------------------------------|----------------|
| Recorder No.                 | Blower No. | Date             | Actual Flowrate (ft <sup>3</sup> /min) | R <sup>2</sup> |
| B35                          | B35        | 04/02/2026       | y = 1.154x-3.696                       | 0.996          |
| B36                          | B36        | 04/02/2026       | y = 1.119x-2.463                       | 0.997          |
| B37                          | B37        | 04/02/2026       | y = 1.129x-3.721                       | 0.998          |
| B38                          | B38        | 02/02/2026       | y = 1.182x-2.931                       | 0.997          |
| B39                          | B39        | 02/02/2026       | y = 1.062x-1.512                       | 0.999          |
| B40                          | B40        | 02/02/2026       | y = 1.163x-3.556                       | 0.997          |
| B41                          | B41        | 02/02/2026       | y = 1.116x-1.975                       | 0.996          |
| B42                          | B42        | 02/02/2026       | y = 1.152x-4.140                       | 0.997          |
| B43                          | B43        | 02/02/2026       | y = 1.167x-3.646                       | 0.996          |
| B44                          | B44        | 02/02/2026       | y = 1.178x-4.362                       | 0.999          |
| R01                          | R01        | 02/02/2026       | y = 1.097x-2.630                       | 0.997          |
| R02                          | R02        | 02/02/2026       | y = 1.138x-3.218                       | 0.996          |
| R03                          | R03        | 02/02/2026       | y = 1.133x-3.084                       | 0.998          |
| R04                          | R04        | 02/02/2026       | y = 1.121x-2.102                       | 0.998          |
| R05                          | R05        | 02/02/2026       | y = 1.041x+0.894                       | 0.997          |
| R06                          | R06        | 02/02/2026       | y = 1.075x+0.254                       | 0.997          |
| R07                          | R07        | 03/02/2026       | y = 1.126x-2.841                       | 0.996          |
| R08                          | R08        | 03/02/2026       | y = 1.091x-2.104                       | 0.996          |
| R09                          | R09        | 03/02/2026       | y = 1.065x+0.557                       | 0.996          |
| R10                          | R10        | 03/02/2026       | y = 1.093x-1.217                       | 0.999          |
| R11                          | R11        | 03/02/2026       | y = 1.130x-3.938                       | 0.999          |
| R12                          | R12        | 05/02/2026       | y = 1.164x-2.698                       | 0.997          |
| R13                          | R13        | 05/02/2026       | y = 1.120x-3.336                       | 0.998          |
| R14                          | R14        | 05/02/2026       | y = 1.034x+0.445                       | 0.997          |
| R15                          | R15        | 05/02/2026       | y = 1.076x+0.429                       | 0.998          |
| R16                          | R16        | 05/02/2026       | y = 1.107x-1.468                       | 0.996          |
| R17                          | R17        | 05/02/2026       | y = 1.078x-1.668                       | 0.998          |
| R18                          | R18        | 05/02/2026       | y = 1.160x-5.001                       | 0.997          |
| R19                          | R19        | 05/02/2026       | y = 1.077x-2.680                       | 0.997          |
| R20                          | R20        | 05/02/2026       | y = 1.185x-4.839                       | 0.998          |



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### High Volume PM-10 Air Sampler Calibration Report

Calibration Method : Multipoint Orifice Flow Transfer Standard      Model : TE 5025A      S/N : 3611

#### Calibration Data

| High Volume PM-10 Data |            | Calibration Data |                                        |                |
|------------------------|------------|------------------|----------------------------------------|----------------|
| Recorder No.           | Blower No. | Date             | Actual Flowrate (ft <sup>3</sup> /min) | R <sup>2</sup> |
| B01                    | B01        | 02/02/2026       | y = 1.066x-0.702                       | 0.998          |
| B02                    | B02        | 02/02/2026       | y = 1.076x+0.303                       | 0.999          |
| B03                    | B03        | 02/02/2026       | y = 1.040x+0.622                       | 0.997          |
| B04                    | B04        | 02/02/2026       | y = 1.135x-2.410                       | 0.998          |
| B05                    | B05        | 02/02/2026       | y = 1.073x-1.284                       | 0.997          |
| B06                    | B06        | 02/02/2026       | y = 1.017x+2.340                       | 0.998          |
| B07                    | B07        | 02/02/2026       | y = 1.036x+0.117                       | 0.998          |
| B08                    | B08        | 02/02/2026       | y = 1.144x-2.648                       | 0.997          |
| B09                    | B09        | 02/02/2026       | y = 1.115x-4.423                       | 0.999          |
| B10                    | B10        | 02/02/2026       | y = 1.090x-2.056                       | 0.999          |
| B11                    | B11        | 03/02/2026       | y = 1.112x-3.640                       | 0.997          |
| B12                    | B12        | 03/02/2026       | y = 1.136x-4.495                       | 0.997          |
| B13                    | B13        | 03/02/2026       | y = 1.119x-2.873                       | 0.999          |
| B14                    | B14        | 03/02/2026       | y = 1.145x-3.948                       | 0.996          |
| B15                    | B15        | 03/02/2026       | y = 1.137x-2.722                       | 0.999          |
| B16                    | B16        | 03/02/2026       | y = 1.087x+0.251                       | 0.997          |
| B17                    | B17        | 03/02/2026       | y = 1.096x-0.862                       | 0.998          |
| B18                    | B18        | 03/02/2026       | y = 1.111x-3.264                       | 0.996          |
| B19                    | B19        | 03/02/2026       | y = 1.081x+0.507                       | 0.998          |
| B20                    | B20        | 03/02/2026       | y = 1.137x-3.001                       | 0.999          |
| B21                    | B21        | 03/02/2026       | y = 1.129x-3.073                       | 0.999          |
| B22                    | B22        | 03/02/2026       | y = 1.130x-2.275                       | 0.998          |
| B23                    | B23        | 03/02/2026       | y = 1.149x-4.649                       | 0.997          |
| B24                    | B24        | 03/02/2026       | y = 1.103x-2.139                       | 0.999          |
| B25                    | B25        | 03/02/2026       | y = 1.065x-1.466                       | 0.999          |
| B26                    | B26        | 03/02/2026       | y = 1.035x+0.731                       | 0.998          |
| B27                    | B27        | 03/02/2026       | y = 1.102x-2.849                       | 0.998          |
| B28                    | B28        | 03/02/2026       | y = 1.138x-3.306                       | 0.996          |
| B29                    | B29        | 03/02/2026       | y = 1.046x+0.180                       | 0.997          |
| B30                    | B30        | 03/02/2026       | y = 1.140x-5.125                       | 0.999          |
| B31                    | B31        | 03/02/2026       | y = 1.028x+0.644                       | 0.998          |
| B32                    | B32        | 04/02/2026       | y = 1.044x+1.254                       | 0.999          |
| B33                    | B33        | 04/02/2026       | y = 1.106x-2.101                       | 0.999          |
| B34                    | B34        | 04/02/2026       | y = 1.059x+0.598                       | 0.998          |



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### Gas Sampler Box Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Dry Cal DCL-ML      S/N : 136164

#### Calibration Data

| Gas Sampler |           | Calibration Data |                                        |                           |                    |                  |                    |
|-------------|-----------|------------------|----------------------------------------|---------------------------|--------------------|------------------|--------------------|
| No.         | Rotameter | Date             | Setting<br>(Constant Flow)<br>(ml/min) | Actual Flow Rate (ml/min) |                    |                  |                    |
|             |           |                  |                                        | Sampling Line A           |                    | Sampling Line B  |                    |
|             |           |                  |                                        | Normal Condition          | Standard Condition | Normal Condition | Standard Condition |
| B01         | 2 (A&B)   | 02/03/2026       | 200                                    | 200.6                     | 200.7              | 200.3            | 200.4              |
| B02         | 2 (A&B)   | 02/03/2026       | 200                                    | 200.4                     | 200.5              | 200.6            | 200.7              |
| B03         | 2 (A&B)   | 04/03/2026       | 200                                    | 200.3                     | 200.4              | 200.1            | 200.2              |
| B04         | 2 (A&B)   | 04/03/2026       | 200                                    | 200.4                     | 200.5              | 200.7            | 200.8              |
| B05         | 2 (A&B)   | 02/03/2026       | 200                                    | 200.2                     | 200.3              | 200.5            | 200.6              |
| B06         | 2 (A&B)   | 02/03/2026       | 200                                    | 200.4                     | 200.5              | 200.1            | 200.2              |
| B07         | 2 (A&B)   | 05/03/2026       | 200                                    | 199.8                     | 199.9              | 200.3            | 200.4              |
| B08         | 2 (A&B)   | 05/03/2026       | 200                                    | 200.2                     | 200.3              | 200.6            | 200.7              |
| B09         | 2 (A&B)   | 02/03/2026       | 200                                    | 200.6                     | 200.7              | 200.4            | 200.5              |
| B10         | 2 (A&B)   | 02/03/2026       | 200                                    | 200.5                     | 200.6              | 200.7            | 200.8              |
| B11         | 2 (A&B)   | 02/03/2026       | 200                                    | 200.3                     | 200.4              | 199.8            | 199.9              |
| B12         | 2 (A&B)   | 02/03/2026       | 200                                    | 200.4                     | 200.5              | 200.1            | 200.2              |
| B13         | 2 (A&B)   | 05/03/2026       | 200                                    | 200.2                     | 200.3              | 200.5            | 200.6              |
| B14         | 2 (A&B)   | 05/03/2026       | 200                                    | 200.4                     | 200.5              | 200.7            | 200.8              |
| B15         | 2 (A&B)   | 05/03/2026       | 200                                    | 200.5                     | 200.6              | 200.2            | 200.3              |
| B16         | 2 (A&B)   | 04/03/2026       | 200                                    | 200.2                     | 200.3              | 200.6            | 200.7              |
| B17         | 2 (A&B)   | 04/03/2026       | 200                                    | 200.1                     | 200.2              | 200.4            | 200.5              |



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| CALIBRATION REPORT                                               |                                   |                   |                            |                                |       |
|------------------------------------------------------------------|-----------------------------------|-------------------|----------------------------|--------------------------------|-------|
| CHEMILUMINESCENT NO / NO <sub>2</sub> / NO <sub>x</sub> ANALYZER |                                   |                   |                            |                                |       |
| DATE :                                                           | 02 May 2026                       | BRAND :           | API                        | MODEL :                        | 200E  |
| NO.                                                              | NOX-B07                           | SERIAL NO.        | 4338                       |                                |       |
| Calibrator (Dilution System)                                     |                                   |                   |                            |                                |       |
| Brand                                                            | : API                             |                   | Model                      | : 700                          |       |
| Last Cal. Date                                                   | : 01 September 2025               |                   | Serial No.                 | : 911                          |       |
| Reference Standard Gas                                           |                                   |                   |                            |                                |       |
| Standard Gas                                                     | : Nitric Oxide (NO)               |                   | Cylinder No.               | : A006745V                     |       |
| Certified Date                                                   | : 12 March 2025                   |                   | Expired Date               | : 12 March 2028                |       |
|                                                                  |                                   |                   | Cylinder Conc.             | : 48.7 ppm                     |       |
| CALIBRATING CONDITION                                            |                                   |                   |                            |                                |       |
| Pressure                                                         | 1011                              | mmbar             | Temp.                      | 24.5                           | °C    |
|                                                                  |                                   |                   | % RH                       | 48                             |       |
| CALIBRATION SETTING                                              |                                   |                   |                            |                                |       |
| Span                                                             | Initial Reading (Before Adj.),PPB |                   |                            | Final Reading (After Adj.),PPB |       |
| Set Point                                                        | Expected Concentration            | Analyzer Response | %Dif                       | Analyzer Response              | Slope |
| Zero                                                             | 0                                 | 0.10              | -                          | 0                              | -     |
| NO Span                                                          | 400                               | 399.8             | -0.050                     | 400.0                          | 1.007 |
| NO <sub>x</sub> Span                                             | 400                               | 400.1             | 0.025                      | 400.0                          | 1.010 |
| API Model 200E NO <sub>x</sub> Analyzer Check List               |                                   |                   |                            |                                |       |
| Test Values                                                      | Observed Value                    | Units             | Nominal Range              |                                |       |
| RANGE                                                            | 500                               | PPB               | 500 standard               |                                |       |
| STABILITY (Zero Gas)                                             | 0.1                               | PPB               | < 2 with zero air          |                                |       |
| SAMPLE FLOW                                                      | 505                               | cc/min            | 500 ± 50                   |                                |       |
| OZONE FLOW                                                       | 78                                | cc/min            | 80 ± 15                    |                                |       |
| PMT                                                              | 103.1                             | mV                | -20 - 150                  |                                |       |
| AZERO                                                            | 93.8                              | mV                | -20 - 150                  |                                |       |
| HVPS                                                             | 675                               | V                 | 420 - 900 constant         |                                |       |
| RCCELL TEMP                                                      | 50.1                              | °C                | 50 ± 1                     |                                |       |
| BOX TEMP                                                         | 29.5                              | °C                | 8 - 48                     |                                |       |
| PMT TEMP                                                         | 7.2                               | °C                | 7 ± 2                      |                                |       |
| MOLY TEMP                                                        | 315.3                             | °C                | 315 ± 5                    |                                |       |
| RCCELL PRESS                                                     | 8.3                               | IN-Hg-A           | 2 - 10 constant            |                                |       |
| SAMPLE PRESS                                                     | 28.6                              | IN-Hg-A           | 25 - 30 constant           |                                |       |
| NO Span Conc                                                     | 400                               | PPB               | 20 - 20,000                |                                |       |
| NO <sub>x</sub> Span Conc                                        | 400                               | PPB               | 20 - 20,000                |                                |       |
| NO Slope                                                         | 1.007                             | -                 | 1.0 ± 0.3                  |                                |       |
| NO <sub>x</sub> Slope                                            | 1.010                             | -                 | 1.0 ± 0.3                  |                                |       |
| NO Offset                                                        | 1.2                               | mV                | -20 to +150                |                                |       |
| NO <sub>x</sub> Offset                                           | 0.8                               | mV                | -20 to 150                 |                                |       |
| Stability at Zero                                                | 0.1                               | PPB               | < 0.2                      |                                |       |
| Stability at Span                                                | 0.2                               | PPB               | < 2 ppb @ 400 ppb span gas |                                |       |



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7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900  
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

| CALIBRATION REPORT                                               |                                   |                   |                            |                                |       |
|------------------------------------------------------------------|-----------------------------------|-------------------|----------------------------|--------------------------------|-------|
| CHEMILUMINESCENT NO / NO <sub>2</sub> / NO <sub>x</sub> ANALYZER |                                   |                   |                            |                                |       |
| DATE :                                                           | 02 May 2026                       | BRAND :           | API                        | MODEL :                        | 200E  |
| NO.                                                              | NOX-B09                           | SERIAL NO.        | 4412                       |                                |       |
| Calibrator (Dilution System)                                     |                                   |                   |                            |                                |       |
| Brand                                                            | : API                             |                   | Model                      | : 700                          |       |
| Last Cal. Date                                                   | : 01 September 2025               |                   | Serial No.                 | : 911                          |       |
| Reference Standard Gas                                           |                                   |                   |                            |                                |       |
| Standard Gas                                                     | : Nitric Oxide (NO)               |                   | Cylinder No.               | : A006745V                     |       |
| Certified Date                                                   | : 12 March 2025                   |                   | Expired Date               | : 12 March 2028                |       |
|                                                                  |                                   |                   | Cylinder Conc.             | : 48.7 ppm                     |       |
| CALIBRATING CONDITION                                            |                                   |                   |                            |                                |       |
| Pressure                                                         | 1011                              | mmbar             | Temp.                      | 24.5                           | °C    |
|                                                                  |                                   |                   | % RH                       | 48                             |       |
| CALIBRATION SETTING                                              |                                   |                   |                            |                                |       |
| Span                                                             | Initial Reading (Before Adj.),PPB |                   |                            | Final Reading (After Adj.),PPB |       |
| Set Point                                                        | Expected Concentration            | Analyzer Response | %Dif                       | Analyzer Response              | Slope |
| Zero                                                             | 0                                 | -0.10             | -                          | 0                              | -     |
| NO Span                                                          | 400                               | 399.9             | -0.025                     | 400.0                          | 1.008 |
| NO <sub>x</sub> Span                                             | 400                               | 400.2             | 0.050                      | 400.0                          | 1.011 |
| API Model 200E NO <sub>x</sub> Analyzer Check List               |                                   |                   |                            |                                |       |
| Test Values                                                      | Observed Value                    | Units             | Nominal Range              |                                |       |
| RANGE                                                            | 500                               | PPB               | 500 standard               |                                |       |
| STABILITY (Zero Gas)                                             | 0.1                               | PPB               | < 2 with zero air          |                                |       |
| SAMPLE FLOW                                                      | 508                               | cc/min            | 500 ± 50                   |                                |       |
| OZONE FLOW                                                       | 78                                | cc/min            | 80 ± 15                    |                                |       |
| PMT                                                              | 103.4                             | mV                | -20 - 150                  |                                |       |
| AZERO                                                            | 94.2                              | mV                | -20 - 150                  |                                |       |
| HVPS                                                             | 670                               | V                 | 420 - 900 constant         |                                |       |
| RCCELL TEMP                                                      | 50.2                              | °C                | 50 ± 1                     |                                |       |
| BOX TEMP                                                         | 29.4                              | °C                | 8 - 48                     |                                |       |
| PMT TEMP                                                         | 7.3                               | °C                | 7 ± 2                      |                                |       |
| MOLY TEMP                                                        | 314.9                             | °C                | 315 ± 5                    |                                |       |
| RCCELL PRESS                                                     | 8.4                               | IN-Hg-A           | 2 - 10 constant            |                                |       |
| SAMPLE PRESS                                                     | 28.7                              | IN-Hg-A           | 25 - 30 constant           |                                |       |
| NO Span Conc                                                     | 400                               | PPB               | 20 - 20,000                |                                |       |
| NO <sub>x</sub> Span Conc                                        | 400                               | PPB               | 20 - 20,000                |                                |       |
| NO Slope                                                         | 1.008                             | -                 | 1.0 ± 0.3                  |                                |       |
| NO <sub>x</sub> Slope                                            | 1.011                             | -                 | 1.0 ± 0.3                  |                                |       |
| NO Offset                                                        | 1.4                               | mV                | -20 to +150                |                                |       |
| NO <sub>x</sub> Offset                                           | 0.9                               | mV                | -20 to 150                 |                                |       |
| Stability at Zero                                                | 0.1                               | PPB               | < 0.2                      |                                |       |
| Stability at Span                                                | 0.2                               | PPB               | < 2 ppb @ 400 ppb span gas |                                |       |



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Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

| CALIBRATION REPORT                                               |                                   |                   |                            |                                |       |
|------------------------------------------------------------------|-----------------------------------|-------------------|----------------------------|--------------------------------|-------|
| CHEMILUMINESCENT NO / NO <sub>2</sub> / NO <sub>x</sub> ANALYZER |                                   |                   |                            |                                |       |
| DATE :                                                           | 02 May 2026                       | BRAND :           | API                        | MODEL :                        | 200E  |
| NO.                                                              | NOX-B19                           | SERIAL NO.        | 353                        |                                |       |
| Calibrator (Dilution System)                                     |                                   |                   |                            |                                |       |
| Brand                                                            | : API                             |                   | Model                      | : 700                          |       |
| Last Cal. Date                                                   | : 01 September 2025               |                   | Serial No.                 | : 911                          |       |
| Reference Standard Gas                                           |                                   |                   |                            |                                |       |
| Standard Gas                                                     | : Nitric Oxide (NO)               |                   | Cylinder No.               | : A00674SV                     |       |
| Certified Date                                                   | : 12 March 2025                   |                   | Expired Date               | : 12 March 2028                |       |
| Cylinder Conc.                                                   | : 48.7 ppm                        |                   |                            |                                |       |
| CALIBRATING CONDITION                                            |                                   |                   |                            |                                |       |
| Pressure                                                         | 1011                              | mmbar             | Temp.                      | 24.5                           | °C    |
| % RH                                                             | 48                                |                   |                            |                                |       |
| CALIBRATION SETTING                                              |                                   |                   |                            |                                |       |
| Span                                                             | Initial Reading (Before Adj.),PPB |                   |                            | Final Reading (After Adj.),PPB |       |
| Set Point                                                        | Expected Concentration            | Analyzer Response | %Dif                       | Analyzer Response              | Slope |
| Zero                                                             | 0                                 | 0.11              | -                          | 0                              | -     |
| NO Span                                                          | 400                               | 400.2             | 0.050                      | 400.0                          | 1.010 |
| NO <sub>x</sub> Span                                             | 400                               | 400.3             | 0.075                      | 400.0                          | 1.013 |
| API Model 200E NO <sub>x</sub> Analyzer Check List               |                                   |                   |                            |                                |       |
| Test Values                                                      | Observed Value                    | Units             | Nominal Range              |                                |       |
| RANGE                                                            | 500                               | PPB               | 500 standard               |                                |       |
| STABILITY (Zero Gas)                                             | 0.1                               | PPB               | < 2 with zero air          |                                |       |
| SAMPLE FLOW                                                      | 512                               | cc/min            | 500 ± 50                   |                                |       |
| OZONE FLOW                                                       | 79                                | cc/min            | 80 ± 15                    |                                |       |
| PMT                                                              | 103.0                             | mV                | -20 - 150                  |                                |       |
| AZERO                                                            | 93.7                              | mV                | -20 - 150                  |                                |       |
| HVPS                                                             | 671                               | V                 | 420 - 900 constant         |                                |       |
| RCCELL TEMP                                                      | 50.4                              | °C                | 50 ± 1                     |                                |       |
| BOX TEMP                                                         | 29.0                              | °C                | 8 - 48                     |                                |       |
| PMT TEMP                                                         | 7.5                               | °C                | 7 ± 2                      |                                |       |
| MOLY TEMP                                                        | 315.4                             | °C                | 315 ± 5                    |                                |       |
| RCCELL PRESS                                                     | 8.2                               | IN-Hg-A           | 2 - 10 constant            |                                |       |
| SAMPLE PRESS                                                     | 28.4                              | IN-Hg-A           | 25 - 30 constant           |                                |       |
| NO Span Conc                                                     | 400                               | PPB               | 20 - 20,000                |                                |       |
| NO <sub>x</sub> Span Conc                                        | 400                               | PPB               | 20 - 20,000                |                                |       |
| NO Slope                                                         | 1.010                             | -                 | 1.0 ± 0.3                  |                                |       |
| NO <sub>x</sub> Slope                                            | 1.013                             | -                 | 1.0 ± 0.3                  |                                |       |
| NO Offset                                                        | 1.7                               | mV                | -20 to +150                |                                |       |
| NO <sub>x</sub> Offset                                           | 1.1                               | mV                | -20 to 150                 |                                |       |
| Stability at Zero                                                | 0.1                               | PPB               | < 0.2                      |                                |       |
| Stability at Span                                                | 0.2                               | PPB               | < 2 ppb @ 400 ppb span gas |                                |       |



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



CERTIFICATE No : 26M2266  
REFERENCE No : 80204-1

PAGE : 1 OF 2

## Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE  
MANUFACTURER : METTLER TOLEDO  
MODEL : XS105DU  
SERIAL No : 1126422905  
ID No : BA 05/50  
CONDITION AS RECEIVED : USED ITEM  
SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.  
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,  
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY :   
CALIBRATION DATE : 05-Mar-26

APPROVED BY :   
ISSUED DATE : 06-Mar-26  
RECEIVED DATE : 05-Mar-26

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





# QUALITY CALIBRATION CO.,LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkac, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

www.qcalibration.com

CERTIFICATE No : 26M2266

PAGE : 2 OF 2

## Calibration Report

EQUIPMENT : DIGITAL BALANCE  
MANUFACTURER : METTLER TOLEDO  
ID No : BA 05/50  
AIR PRESSURE : 1004mbar ± 1mbar  
AMBIENT TEMPERATURE : 25° C ± 1° C  
MODEL : XS105DU  
S/N : 1126422905  
RECEIVED DATE : 05-Mar-26  
CALIBRATION DATE : 05-Mar-26  
RELATIVE HUMIDITY : 50 %RH ± 10 % RH

### CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS NOT ADJUSTED BEFORE CALIBRATION. THE BALANCE HAS NO ZERO TRACKING FUNCTION. REPEATABILITY WAS MEASURED BY USING 10 REPEATED MEASUREMENTS. LINEARITY WAS MEASURED COVERING 10 POINTS, EVENLY SPREAD OVER THE RANGE. THE INSTRUMENT WAS SET ZERO BEFORE PERFORMING THE LINEARITY TEST. OFF-CENTER LOADING WAS MEASURED BY USING STANDARD WEIGHTS PLACED ON THE PAN AND MOVED TO VARIOUS POSITIONS ON THE PAN.

2. REFERENCE STANDARD INSTRUMENTS :-

| INSTRUMENT             | MODEL | SERIAL No | CERTIFICATE No | DUE DATE  |
|------------------------|-------|-----------|----------------|-----------|
| 1) STANDARD WEIGHT SET | E2    | QK-I-151  | C02250116      | 28-Jan-27 |
| 2) STANDARD WEIGHT     | E2    | 15843     | C02250117      | 29-Jan-27 |

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.

4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

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

- NATIONAL INSTITUTE OF METROLOGY (THAILAND)

### RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL

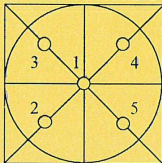
2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 120 g WAS 0.000055 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

| NOMINAL VALUE (g) | BALANCE READING (g) | CORRECTION (g) | UNCERTAINTY (± g) |
|-------------------|---------------------|----------------|-------------------|
| 0.00              | 0.00000             | 0.00000        | 0.000065          |
| 0.02              | 0.02000             | 0.00000        | 0.000065          |
| 0.10              | 0.10000             | 0.00000        | 0.000066          |
| 0.20              | 0.20000             | 0.00000        | 0.000066          |
| 0.50              | 0.50001             | -0.00001       | 0.000065          |
| 1.00              | 1.00001             | -0.00001       | 0.000066          |
| 2.00              | 2.00000             | 0.00000        | 0.000067          |
| 5.00              | 5.00001             | -0.00001       | 0.000068          |
| 10.00             | 10.00004            | -0.00004       | 0.000070          |
| 20.00             | 20.00006            | -0.00006       | 0.000078          |
| 50.00             | 50.00000            | 0.00000        | 0.00012           |
| 100.00            | 100.0002            | -0.0002        | 0.00019           |
| 120.00            | 120.0002            | -0.0002        | 0.00022           |

5. OFF CENTER LOADING ERROR



| POINT              | READING (g) |
|--------------------|-------------|
| 1                  | 50.0000     |
| 2                  | 50.0000     |
| 3                  | 50.0000     |
| 4                  | 50.0000     |
| 5                  | 50.0000     |
| OFF-CENTER LOADING | 0.0000      |

NOTE: THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA  
THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR  $k=2$ , PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



# SITHIPHORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

451-451/1 Sirinthon Road, Bangbunru, Bangplud, Bangkok, 10700 Thailand  
Tel. +66 2433 8331 Email : calibration@sithiphorn.com

SITHIPHORN  
associates



Cert. No. : SP25026

Pages : 1 of 4

## Calibration Certificate

Equipment : UV-VIS SPECTROPHOTOMETER  
Manufacturer : PERKINELMER  
Model : LAMBDA 25  
Serial No.: 501S14123010  
ID No.: SP03/58  
Calibration Mode : WAVELENGTH ACCURACY  
PHOTOMETRIC ACCURACY  
STRAY LIGHT

Condition As Found : GOOD

Customer : S.P.S CONSULTING SERVICE CO., LTD.  
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN ROAD,  
CHOMPHON SUB-DISTRICT, CHATUCHAK DISTRICT,  
BANGKOK PROVINCE 10900 THAILAND.

Location : ORGANIC LABORATORY IV

Ambient Temperature : ( 22.9 ± 5 ) °C

Relative Humidity : ( 53.7 ± 25 ) %

Received Date : 22 AUGUST 2025

Calibration Date : 22 AUGUST 2025

Date of Issue : 25 AUGUST 2025

Calibrated by :

Approved by :

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

Cert. No. : SP25026  
Job No. : VC68SP0019  
Pages : 2 of 4

**Calibration Method :**

This instrument was calibrated by using on-site calibration procedure In-house method : CP-SP-01  
The calibration procedure to direct measurement wavelength accuracy by using wavelength standard solution, Photometric accuracy by using absorbance standard filter and absorbance standard solution  
The calibration procedure used was based on ASTM E275-01, ASTM E925-02

**Condition of this result of calibration :**

1. Certified reference materials

| Material                       | Ref. type     | Cell serial No. | Cert. No.  | Due Date   |
|--------------------------------|---------------|-----------------|------------|------------|
| Holmium liquid                 | RM-HL         | 29706           | 126461     | 24/10/2026 |
| Didymium liquid                | RM-DL         | 28912           | 126462     | 24/10/2026 |
| Neutral density filter         | RM-1N2N3N     | 13877           | 126457     | 24/10/2026 |
| Potassium dichromate solutions | RM-0204060810 | 14204           | 126497     | 25/10/2026 |
| Potassium Iodide solution      | -             | KI-0701-001     | CI-0185-24 | 14/05/2026 |

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

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

3.1 The UK National Physical Laboratory (NPL)

**Result of calibration : Wavelength Accuracy**

(Without adjustment)

| Material | Certified Values of Reference Material (nm) | UUC* Reading (nm) | Error (nm) | Uncertainty ± (nm) | k Factor |
|----------|---------------------------------------------|-------------------|------------|--------------------|----------|
| RM-HL    | 278.13                                      | 278.21            | 0.08       | 0.16               | 2.00     |
|          | 361.25                                      | 361.39            | 0.14       | 0.16               | 2.00     |
|          | 467.82                                      | 467.71            | -0.11      | 0.16               | 2.00     |
|          | 536.56                                      | 536.50            | -0.06      | 0.16               | 2.00     |
|          | 640.50                                      | 640.36            | -0.14      | 0.16               | 2.00     |
| RM-DL    | 740.09                                      | 739.85            | -0.24      | 0.16               | 2.00     |
|          | 864.94                                      | 865.12            | 0.18       | 0.16               | 2.00     |

UUC\* = Unit Under Calibration

Michael B.

Cert. No. : SP25026  
Job No. : VC68SP0019  
Pages : 3 of 4

**Result of calibration : Photometric Accuracy**

| Material                     | Wavelength (nm) | Filter S/N | Nominal Absorbance (A) | Certified Absorbance (A) | UUC* Reading Absorbance (A) | Error (A) | Uncertainty ± (A) | k Factor |
|------------------------------|-----------------|------------|------------------------|--------------------------|-----------------------------|-----------|-------------------|----------|
| Neutral Density glass filter | 440.0           | 29381      | 0.5                    | 0.5443                   | 0.5413                      | -0.0030   | 0.0043            | 2.00     |
|                              |                 | 29914      | 0.7                    | 0.7484                   | 0.7455                      | -0.0029   | 0.0054            | 2.00     |
|                              |                 | 29360      | 1.0                    | 1.0527                   | 1.0535                      | 0.0008    | 0.0032            | 2.00     |
|                              | 465.0           | 29381      | 0.5                    | 0.4948                   | 0.4922                      | -0.0026   | 0.0041            | 2.00     |
|                              |                 | 29914      | 0.7                    | 0.6906                   | 0.6877                      | -0.0029   | 0.0050            | 2.00     |
|                              |                 | 29360      | 1.0                    | 0.9695                   | 0.9709                      | 0.0014    | 0.0031            | 2.00     |
|                              | 546.1           | 29381      | 0.5                    | 0.5090                   | 0.5068                      | -0.0022   | 0.0036            | 2.00     |
|                              |                 | 29914      | 0.7                    | 0.6985                   | 0.6960                      | -0.0025   | 0.0041            | 2.00     |
|                              |                 | 29360      | 1.0                    | 0.9814                   | 0.9825                      | 0.0011    | 0.0031            | 2.00     |
|                              | 590.0           | 29381      | 0.5                    | 0.5375                   | 0.5353                      | -0.0022   | 0.0034            | 2.00     |
|                              |                 | 29914      | 0.7                    | 0.7256                   | 0.7231                      | -0.0025   | 0.0037            | 2.00     |
|                              |                 | 29360      | 1.0                    | 1.0213                   | 1.0219                      | 0.0006    | 0.0032            | 2.00     |
|                              | 635.0           | 29381      | 0.5                    | 0.5223                   | 0.5202                      | -0.0021   | 0.0033            | 2.00     |
|                              |                 | 29914      | 0.7                    | 0.6927                   | 0.6901                      | -0.0026   | 0.0036            | 2.00     |
|                              |                 | 29360      | 1.0                    | 0.9744                   | 0.9750                      | 0.0006    | 0.0032            | 2.00     |

UUC\* = Unit Under Calibration

Michael B.

Cert. No. : SP25026  
Job No. : VC68SP0019  
Pages : 4 of 4

**Result of calibration : Photometric Accuracy**

(Without adjustment)

| Material                          | Wavelength<br>(nm) | Solution<br>(mg/l) | Certified<br>Absorbance (A) | UUC* Reading<br>Absorbance (A) | Error<br>(A) | Uncertainty<br>± (A) | k<br>Factor |
|-----------------------------------|--------------------|--------------------|-----------------------------|--------------------------------|--------------|----------------------|-------------|
| Potassium<br>dichromate solutions | 235.0              | 20                 | 0.2415                      | 0.2443                         | 0.0028       | 0.0101               | 2.00        |
|                                   |                    | 40                 | 0.4866                      | 0.4871                         | 0.0005       | 0.0115               | 2.00        |
|                                   |                    | 60                 | 0.7415                      | 0.7295                         | -0.0120      | 0.0067               | 2.00        |
|                                   |                    | 80                 | 0.9854                      | 0.9844                         | -0.0010      | 0.0071               | 2.00        |
|                                   |                    | 100                | 1.2444                      | 1.2425                         | -0.0019      | 0.0073               | 2.00        |

UUC\* = Unit Under Calibration

**Condition of this result of calibration : Spectrophotometer PERKINELMER Model LAMBDA 25 S/N 501S14123010**

Resolution of Wavelength Mode 0.1 nm

Resolution of Photometric Mode 0.001 A

**Parameter Setting**

Measurement Mode Wavelength, Absorbance

Wavelength Scan 190 nm - 1100 nm

Scanning Speed 7.5 nm/min

Band width(Wavelength) 1.0

Band width(Vis) 1.0

Band width(Uv) 1.0

| Stray Light** UUC* Reading at 220.0 nm |               |
|----------------------------------------|---------------|
| Transimission T(%)                     | Absorbance(A) |
| 0.020                                  | 3.7032        |

\*\*Specific Acceptance :

Transmission ≤ 1.0 T(%), Absorbance ≥ 2.0 A

\*\*Stray light not TISI Accredited

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

————— **End of Calibration Certificate** —————

## เอกสารที่ 5-2

เอกสารสอบเทียบเครื่องมือการตรวจวัดคุณภาพอากาศจากปล่อง



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด  
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7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatchak, Bangkok 10900  
Tel : (662) 939-4370-72. Fax : (662) 513-4221. E-mail : sale@spscon.com., www.spscon.com

### Console Calibration Report

Calibration Method

Critical Orifices

#### Calibration Data

| Console Data |            | Calibration Data |       |                                   |
|--------------|------------|------------------|-------|-----------------------------------|
| No.          | Serial No. | Date             | y     | $\Delta H_p$ (mmH <sub>2</sub> O) |
| B01          | 1563       | 02/03/2026       | 0.998 | 49.85                             |
| B02          | 8002514    | 02/03/2026       | 1.003 | 49.77                             |
| B03          | 1503016    | 03/03/2026       | 0.997 | 49.68                             |
| B04          | 00006659   | 03/03/2026       | 0.996 | 49.82                             |
| B05          | 00007428   | 02/03/2026       | 0.999 | 49.65                             |
| R01          | 1561       | 03/03/2026       | 1.002 | 49.98                             |
| R02          | 8002513    | 03/03/2026       | 1.004 | 49.56                             |
| R03          | 1570       | 03/03/2026       | 0.997 | 49.73                             |
| R04          | 8002519    | 03/03/2026       | 0.999 | 49.80                             |
| R05          | 1503015    | 02/03/2026       | 1.003 | 49.95                             |

Remark : Accept Value of y (test) is  $0.97 < y < 1.03$

Accept Value of  $\Delta H_p$  (test) is  $46.7 \pm 6.4$  (mmH<sub>2</sub>O)



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### Pitot Tube Calibration Report

Calibration Method

Standard Pitot Tube

#### Calibration Data

| Pitot Tube Data |               |                               | Calibration Data |                   |        |
|-----------------|---------------|-------------------------------|------------------|-------------------|--------|
| No.             | Type of Pitot | Coefficient of Standard Pitot | Date             | Avg. of Cp (test) |        |
|                 |               |                               |                  | Side A            | Side B |
| B03             | S             | 0.99                          | 02/02/2026       | 0.84              | 0.84   |
| B04             | S             | 0.99                          | 02/02/2026       | 0.84              | 0.83   |
| B05             | S             | 0.99                          | 03/02/2026       | 0.84              | 0.84   |
| B07             | S             | 0.99                          | 04/02/2026       | 0.84              | 0.83   |
| B08             | S             | 0.99                          | 04/02/2026       | 0.85              | 0.84   |
| B09             | S             | 0.99                          | 04/02/2026       | 0.84              | 0.84   |
| B11             | S             | 0.99                          | 03/02/2026       | 0.84              | 0.85   |
| B16             | S             | 0.99                          | 03/02/2026       | 0.83              | 0.84   |
| B18             | S             | 0.99                          | 03/02/2026       | 0.84              | 0.84   |
| B19             | S             | 0.99                          | 02/02/2026       | 0.84              | 0.84   |
| B21             | S             | 0.99                          | 02/02/2026       | 0.84              | 0.83   |
| B24             | S             | 0.99                          | 02/02/2026       | 0.84              | 0.83   |
| B27             | S             | 0.99                          | 02/02/2026       | 0.84              | 0.84   |
| B30             | S             | 0.99                          | 03/02/2026       | 0.84              | 0.85   |
| B31             | S             | 0.99                          | 03/02/2026       | 0.84              | 0.84   |
| B33             | S             | 0.99                          | 03/02/2026       | 0.83              | 0.84   |
| B35             | S             | 0.99                          | 04/02/2026       | 0.84              | 0.84   |

Remark : Accept value of Cp (test) is  $0.84 \pm 0.01$



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### Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

#### Environmental Conditions

Temperature : 25 ± 3 °C  
Pressure : 1010 ± 15 mmbar

| Personal Pump Data |       |           |            | Calibration Data |                    |       |       |                 |       |       |                              |                |
|--------------------|-------|-----------|------------|------------------|--------------------|-------|-------|-----------------|-------|-------|------------------------------|----------------|
| No.                | Brand | Model     | Serial No. | Date             | Flow Rate (ml/min) |       |       |                 |       |       | Value From Calibration Curve |                |
|                    |       |           |            |                  | Setting            |       |       | Actual (Q std.) |       |       |                              |                |
|                    |       |           |            |                  | 1                  | 2     | 3     | 1               | 2     | 3     | y                            | R <sup>2</sup> |
| B01                | SKC   | 224-PCXR4 | 262101     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 1,002           | 1,503 | 2,004 | 1.002x - 1.364               | 1.000          |
| B02                | SKC   | 224-PCXR4 | 626166     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 1,004           | 1,501 | 2,003 | 1.001x - 0.594               | 1.000          |
| B03                | SKC   | 224-PCXR4 | 612968     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 1,003           | 1,502 | 1,994 | 1.003x - 9.098               | 0.999          |
| B04                | SKC   | 224-PCXR4 | 602804     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 1,000           | 1,502 | 1,998 | 0.998x + 0.642               | 1.000          |
| B05                | SKC   | 224-PCXR4 | 612693     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 1,001           | 1,504 | 1,999 | 1.000x - 1.767               | 1.000          |
| B06                | SKC   | 224-PCXR4 | 262188     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 999             | 1,500 | 2,002 | 1.001x - 3.590               | 1.000          |
| B07                | SKC   | 224-PCXR4 | 626262     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 997             | 1,506 | 2,003 | 1.004x - 9.859               | 0.999          |
| B08                | SKC   | 224-PCXR4 | 626100     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 1,003           | 1,503 | 2,005 | 1.003x - 4.160               | 1.000          |
| B09                | SKC   | 224-PCXR4 | 626479     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 998             | 1,497 | 1,997 | 1.000x - 3.382               | 1.000          |
| B10                | SKC   | 224-PCXR4 | 091950     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 1,004           | 1,506 | 1,996 | 1.003x - 7.323               | 0.999          |
| B11                | SKC   | 224-PCXR8 | 564315     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 1,000           | 1,493 | 2,003 | 1.005x - 10.601              | 1.000          |
| B12                | SKC   | 224-PCXR4 | 034656     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 997             | 1,495 | 1,997 | 0.998x - 1.755               | 1.000          |
| B13                | SKC   | 224-PCXR4 | 602073     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 1,001           | 1,501 | 1,986 | 0.996x + 2.884               | 0.999          |
| B14                | SKC   | 224-PCXR4 | 626313     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 999             | 1,494 | 1,997 | 0.999x - 1.898               | 0.999          |
| B15                | SKC   | 224-PCXR4 | 626474     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 996             | 1,498 | 1,993 | 1.007x - 17.126              | 0.999          |
| B16                | SKC   | 224-PCXR4 | 626477     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 1,002           | 1,499 | 1,997 | 0.997x + 1.352               | 1.000          |
| B17                | SKC   | 224-PCXR4 | 626690     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 996             | 1,510 | 1,999 | 1.005x - 12.252              | 0.999          |
| B18                | SKC   | 224-PCXR4 | 691484     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 995             | 1,499 | 1,997 | 1.006x - 12.384              | 1.000          |
| B19                | SKC   | 224-PCXR4 | 691599     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 998             | 1,501 | 1,991 | 1.004x - 10.506              | 0.999          |
| B20                | SKC   | 224-PCXR4 | 691587     | 01/04/2026       | 1,000              | 1,500 | 2,000 | 997             | 1,495 | 1,998 | 1.003x - 7.247               | 1.000          |
| B21                | SKC   | 224-PCXR4 | 691531     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 998             | 1,496 | 1,996 | 1.000x - 3.454               | 1.000          |
| B22                | SKC   | 224-PCXR4 | 691654     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 996             | 1,494 | 1,997 | 0.998x - 2.784               | 1.000          |
| B23                | SKC   | 224-PCXR4 | 798393     | 02/04/2026       | 1,000              | 1,500 | 2,000 | 1,000           | 1,503 | 1,999 | 0.999x - 1.308               | 1.000          |
| B24                | SKC   | 224-PCXR4 | 626363     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 1,001           | 1,509 | 1,995 | 1.002x - 6.940               | 0.999          |
| B25                | SKC   | 224-PCXR4 | 798489     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 1,002           | 1,502 | 2,004 | 1.004x - 7.267               | 1.000          |
| B26                | SKC   | 224-PCXR4 | 798479     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 996             | 1,503 | 2,003 | 1.006x - 12.675              | 1.000          |
| B27                | SKC   | 224-PCXR4 | 691673     | 02/04/2026       | 1,000              | 1,500 | 2,000 | 1,000           | 1,504 | 2,000 | 0.999x + 0.483               | 1.000          |
| B28                | SKC   | 224-PCXR4 | 691570     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 997             | 1,510 | 2,001 | 0.998x - 0.455               | 0.999          |
| B29                | SKC   | 224-PCXR4 | 626472     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 998             | 1,494 | 1,992 | 1.000x - 5.221               | 1.000          |
| B30                | SKC   | 224-PCXR4 | 691489     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 1,008           | 1,504 | 2,006 | 1.003x - 2.114               | 1.000          |
| B31                | SKC   | 224-PCXR4 | 691509     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 1,003           | 1,503 | 2,002 | 0.997x + 0.610               | 0.999          |
| B32                | SKC   | 224-PCXR4 | 091567     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 1,002           | 1,502 | 1,996 | 0.996x + 7.008               | 1.000          |
| B33                | SKC   | 224-PCXR4 | 091756     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 998             | 1,501 | 1,992 | 1.006x - 12.101              | 0.999          |
| B34                | SKC   | 224-PCXR4 | 612962     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 1,001           | 1,494 | 2,004 | 1.004x - 8.196               | 1.000          |
| B35                | SKC   | 224-PCXR4 | 602682     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 997             | 1,504 | 1,998 | 1.000x - 2.804               | 1.000          |
| B36                | SKC   | 224-PCXR4 | 626164     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 996             | 1,512 | 1,996 | 1.001x - 5.867               | 0.999          |
| B37                | SKC   | 224-PCXR4 | 626256     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 999             | 1,496 | 2,005 | 1.007x - 11.487              | 1.000          |
| B38                | SKC   | 224-PCXR4 | 626167     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 1,002           | 1,500 | 2,003 | 1.008x - 16.377              | 0.999          |
| B39                | SKC   | 224-PCXR4 | 034637     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 998             | 1,490 | 1,994 | 0.996x - 0.044               | 1.000          |
| B40                | SKC   | 224-PCXR4 | 798349     | 03/04/2026       | 1,000              | 1,500 | 2,000 | 1,001           | 1,501 | 2,000 | 0.995x + 0.921               | 0.999          |



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### Rotameter Calibration Report (For Personal Pump High Flow Adjust)

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

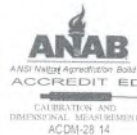
#### Calibration Data

| Rotameter Data |       |        | Calibration Data |                     |       |       |                 |        |        |                              |                |
|----------------|-------|--------|------------------|---------------------|-------|-------|-----------------|--------|--------|------------------------------|----------------|
| No.            | Brand | Model  | Date             | Flow Rate (mL/min)  |       |       |                 |        |        | Value From Calibration Curve |                |
|                |       |        |                  | Flow Rate (Reading) |       |       | Actual (Q std.) |        |        |                              |                |
|                |       |        |                  | 1                   | 2     | 3     | 1               | 2      | 3      | y                            | R <sup>2</sup> |
| H-B01          | Dwyer | VFB-65 | 01/04/2026       | 500                 | 1,000 | 2,000 | 500.8           | 997.7  | 1994.6 | 0.997x + 1.368               | 1.000          |
| H-B02          | Dwyer | VFB-65 | 01/04/2026       | 500                 | 1,000 | 2,000 | 500.9           | 997.0  | 1994.3 | 0.998x + 0.689               | 1.000          |
| H-B03          | Dwyer | VFB-65 | 01/04/2026       | 500                 | 1,000 | 2,000 | 499.5           | 999.8  | 1997.2 | 0.999x - 0.227               | 1.000          |
| H-B04          | Dwyer | VFB-65 | 02/04/2026       | 500                 | 1,000 | 2,000 | 499.4           | 1000.9 | 2000.3 | 1.000x - 1.929               | 0.999          |
| H-B05          | Dwyer | VFB-65 | 02/04/2026       | 500                 | 1,000 | 2,000 | 499.0           | 999.6  | 1998.7 | 1.001x + 0.053               | 1.000          |
| H-B06          | Dwyer | VFB-65 | 02/04/2026       | 500                 | 1,000 | 2,000 | 499.8           | 998.0  | 1996.5 | 0.998x + 0.698               | 1.000          |
| H-B07          | Dwyer | VFB-65 | 01/04/2026       | 500                 | 1,000 | 2,000 | 500.1           | 1000.8 | 1996.2 | 0.999x + 2.423               | 0.999          |
| H-B08          | Dwyer | VFB-65 | 01/04/2026       | 500                 | 1,000 | 2,000 | 499.8           | 1000.1 | 1997.6 | 0.999x - 0.675               | 1.000          |
| H-B09          | Dwyer | VFB-65 | 06/04/2026       | 500                 | 1,000 | 2,000 | 499.6           | 1002.1 | 2002.4 | 1.001x - 6.068               | 0.999          |
| H-B10          | Dwyer | VFB-65 | 06/04/2026       | 500                 | 1,000 | 2,000 | 500.4           | 1001.6 | 1999.6 | 0.999x + 1.475               | 1.000          |



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## CERTIFICATE OF CALIBRATION

### FOR

|                 |                  |
|-----------------|------------------|
| NOMENCLATURE    | VACUUM GAUGE     |
| MANUFACTURER    | HI-LIGHT         |
| MODEL/TYPE      | N/A              |
| SERIAL NO.      | N/A[64-220088-1] |
| CLID.NO.        | 212301422        |
| JOB CONTROL NO. | 240720076546     |

CUSTOMER S.P.S. CONSULTING SERVICE CO., LTD.  
7SOI PHAHOLYOTHrN 24 ROAD., JOMPOL,  
CHATUCHAK, BANGKOK 10900

DATE OF RECEIVED : 19 July 2025

DATE OF ISSUED: 24 July 2025

The report or calibration shall not be reproduced except in full without approval of the Calib.-ation Laboratory Co., Ltd.

Calibrated By :

Approved By :

24 July 2025



This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24076546

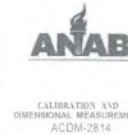
F3-011-05/12-23

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## REPORT OF CALIBRATION

### FOR

|                         |                   |
|-------------------------|-------------------|
| NOMENCLATURE            | VACUUM GAUGE      |
| MANUFACTURER            | HI-LIGHT          |
| MODEL/TYPE              | N/A               |
| SERIAL NO.              | N/A [64-220088-1] |
| DATE OF CALIBRATION     | 23 July 2025      |
| DUE DATE OF CALIBRATION | 23 July 2026      |

### ENVIRONMENT CONDITIONS

Temperature : (23  $\pm$  2) °C

Relative Humidity (55  $\pm$  10) %RH

### PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPPP-05 according to DKD-R 6-1 as calibration guidelines.

The calibration was performed by direct measurement with Document Process Calibrator and Pressure Module which maintained by the Calibration Laboratory Co., Ltd.

### REFERENCE STANDARD USED :

Document Process Calibrator, Fluke Model 741B S/N: 8295020 with Pressure Module Model 700PD5 S/N: 89404505.

### TRACEABILITY :

The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).

Certificate No. MP-0040-24.

### UNCERTAINTY :

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of  $k=2$ . It has been evaluated according to the "Calibration of Pressure Gauges (DKD-R 6-1)" which provides a level of confidence approximately 95%.

Certificate No. Q24076546

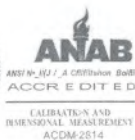
F3-011-05/12-23

page 2 of 3



# CAIBRATION LABORATORY Co., LTD.

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Tel. 02-578-0353-4 Fax:02-578-2672 www.caLaboratory.com Email:sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM :RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS: (X) without adjustment ( ) adjustment

The DUC was exercised by applying a known pressure from its zero to full scale 1 times. Then 2 series of known gauge pressure were applied. The STD reading were recorded and the means value were reported in the table below.

## CALIBRATION DATA

### CORRECTION OF PRESSURE

| DUC Test point<br>( inHg ) | STD Reading ( kPa ) |         | Conversion to inHg |       | Correction ( inHg) |      |
|----------------------------|---------------------|---------|--------------------|-------|--------------------|------|
|                            | Up                  | Down    | Up                 | Down  | Up                 | Down |
| 0                          | 0.00                | 0.00    | 0.0                | 0.0   | 0.0                | 0.0  |
| -5                         | -15.07              | -15.10  | -4.5               | -4.5  | +0.5               | +0.5 |
| -10                        | -32.50              | -32.84  | -9.6               | -9.7  | +0.4               | +0.3 |
| -15                        | -49.44              | -49.77  | -14.6              | -14.7 | +0.4               | +0.3 |
| -20                        | -66.70              | -66.70  | -19.7              | -19.7 | +0.3               | +0.3 |
| -25                        | -83.63              | -83.97  | -24.7              | -24.8 | +0.3               | +0.2 |
| -30                        | -100.39             | -100.39 | -29.6              | -29.6 | +0.4               | +0.4 |

Uncertainty of measurement  $\pm 0.2$  inHg

Transmitting fluid :Air.

Technical Note. Conversion factor 1 kPa ; 0.2953003 inHg

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 012 Page 43 of 67

This report is valid for the above stated instrument/s only.

### End of Certificate ###

Certificate No. Q24076546

F3-011-05/ 12-23

page 3 of 3



QUALITY CALIBRATION CO.,LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkai, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

www.qcalibration.com



CERTIFICATE No : 26M2266

REFERENCE No : 80204-1

PAGE : 1 OF 2

## Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE

MANUFACTURER : METTLER TOLEDO

MODEL : XS105DU

SERIAL No : 1126422905

ID No : BA 05/50

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.  
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,  
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : 

CALIBRATION DATE : 05-Mar-26

APPROVED BY : 

ISSUED DATE : 06-Mar-26

RECEIVED DATE : 05-Mar-26

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



F-G010 REV 03



# QUALITY CALIBRATION CO.,LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkai, Bangkok 10160

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www.qcalibration.com

CERTIFICATE No : 26M2266

PAGE : 2 OF 2

## Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : XS105DU  
MANUFACTURER : METTLER TOLEDO S/N : 1126422905  
ID No : BA 05/50 RECEIVED DATE : 05-Mar-26  
AIR PRESSURE : 1004mbar ± 1mbar CALIBRATION DATE : 05-Mar-26  
AMBIENT TEMPERATURE : 25° C ± 1° C RELATIVE HUMIDITY : 50 %RH ± 10 % RH

### CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS NOT ADJUSTED BEFORE CALIBRATION. THE BALANCE HAS NO ZERO TRACKING FUNCTION. REPEATABILITY WAS MEASURED BY USING 10 REPEATED MEASUREMENTS. LINEARITY WAS MEASURED COVERING 10 POINTS, EVENLY SPREAD OVER THE RANGE. THE INSTRUMENT WAS SET ZERO BEFORE PERFORMING THE LINEARITY TEST. OFF-CENTER LOADING WAS MEASURED BY USING STANDARD WEIGHTS PLACED ON THE PAN AND MOVED TO VARIOUS POSITIONS ON THE PAN.

### 2. REFERENCE STANDARD INSTRUMENTS :-

| INSTRUMENT             | MODEL | SERIAL No | CERTIFICATE No | DUE DATE  |
|------------------------|-------|-----------|----------------|-----------|
| 1) STANDARD WEIGHT SET | E2    | QK-I-151  | C02250116      | 28-Jan-27 |
| 2) STANDARD WEIGHT     | E2    | 15843     | C02250117      | 29-Jan-27 |

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.

4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

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

- NATIONAL INSTITUTE OF METROLOGY (THAILAND)

### RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL

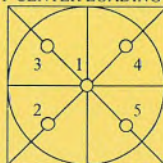
2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 120 g WAS 0.000055 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

| NOMINAL VALUE (g) | BALANCE READING (g) | CORRECTION (g) | UNCERTAINTY (± g) |
|-------------------|---------------------|----------------|-------------------|
| 0.00              | 0.00000             | 0.00000        | 0.000065          |
| 0.02              | 0.02000             | 0.00000        | 0.000065          |
| 0.10              | 0.10000             | 0.00000        | 0.000066          |
| 0.20              | 0.20000             | 0.00000        | 0.000066          |
| 0.50              | 0.50001             | -0.00001       | 0.000065          |
| 1.00              | 1.00001             | -0.00001       | 0.000066          |
| 2.00              | 2.00000             | 0.00000        | 0.000067          |
| 5.00              | 5.00001             | -0.00001       | 0.000068          |
| 10.00             | 10.00004            | -0.00004       | 0.000070          |
| 20.00             | 20.00006            | -0.00006       | 0.000078          |
| 50.00             | 50.00000            | 0.00000        | 0.00012           |
| 100.00            | 100.0002            | -0.0002        | 0.00019           |
| 120.00            | 120.0002            | -0.0002        | 0.00022           |

### 5. OFF CENTER LOADING ERROR



| POINT              | READING (g) |
|--------------------|-------------|
| 1                  | 50.0000     |
| 2                  | 50.0000     |
| 3                  | 50.0000     |
| 4                  | 50.0000     |
| 5                  | 50.0000     |
| OFF-CENTER LOADING | 0.0000      |

NOTE: THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR  $k=2$ , PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



# SITHIPHORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

451-451/1 Sirinthorn Road, Bangbunru, Bangplud, Bangkok, 10700 Thailand

Tel. +66 2433 8331

Email : calibration@sithiphorn.com

SITHIPHORN  
associates



Cert. No. : SP25026

Pages : 1 of 4

## Calibration Certificate

Equipment : UV-VIS SPECTROPHOTOMETER  
Manufacturer : PERKINELMER  
Model : LAMBDA 25  
Serial No.: 501S14123010  
ID No.: SP03/58  
Calibration Mode : WAVELENGTH ACCURACY  
PHOTOMETRIC ACCURACY  
STRAY LIGHT

Condition As Found : GOOD

Customer : S.P.S CONSULTING SERVICE CO., LTD.  
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN ROAD,  
CHOMPHON SUB-DISTRICT, CHATUCHAK DISTRICT,  
BANGKOK PROVINCE 10900 THAILAND.

Location : ORGANIC LABORATORY IV

Ambient Temperature : ( 22.9 ± 5 ) °C

Relative Humidity : ( 53.7 ± 25 ) %

Received Date : 22 AUGUST 2025

Calibration Date : 22 AUGUST 2025

Date of Issue : 25 AUGUST 2025

Calibrated by :

Approved by :

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

Cert. No. : SP25026  
Job No. : VC68SP0019  
Pages : 2 of 4

**Calibration Method :**

This instrument was calibrated by using on-site calibration procedure In-house method : CP-SP-01  
The calibration procedure to direct measurement wavelength accuracy by using wavelength standard solution, Photometric accuracy by using absorbance standard filter and absorbance standard solution  
The calibration procedure used was based on ASTM E275-01, ASTM E925-02

**Condition of this result of calibration :**

1. Certified reference materials

| Material                       | Ref. type     | Cell serial No. | Cert. No.  | Due Date   |
|--------------------------------|---------------|-----------------|------------|------------|
| Holmium liquid                 | RM-HL         | 29706           | 126461     | 24/10/2026 |
| Didymium liquid                | RM-DL         | 28912           | 126462     | 24/10/2026 |
| Neutral density filter         | RM-1N2N3N     | 13877           | 126457     | 24/10/2026 |
| Potassium dichromate solutions | RM-0204060810 | 14204           | 126497     | 25/10/2026 |
| Potassium Iodide solution      | -             | KI-0701-001     | CI-0185-24 | 14/05/2026 |

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

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

3.1 The UK National Physical Laboratory (NPL)

**Result of calibration : Wavelength Accuracy**

(Without adjustment)

| Material | Certified Values of Reference Material (nm) | UUC* Reading (nm) | Error (nm) | Uncertainty ± (nm) | k Factor |
|----------|---------------------------------------------|-------------------|------------|--------------------|----------|
| RM-HL    | 278.13                                      | 278.21            | 0.08       | 0.16               | 2.00     |
|          | 361.25                                      | 361.39            | 0.14       | 0.16               | 2.00     |
|          | 467.82                                      | 467.71            | -0.11      | 0.16               | 2.00     |
|          | 536.56                                      | 536.50            | -0.06      | 0.16               | 2.00     |
|          | 640.50                                      | 640.36            | -0.14      | 0.16               | 2.00     |
| RM-DL    | 740.09                                      | 739.85            | -0.24      | 0.16               | 2.00     |
|          | 864.94                                      | 865.12            | 0.18       | 0.16               | 2.00     |

UUC\* = Unit Under Calibration

Michael B.

Cert. No. : SP25026  
Job No. : VC68SP0019  
Pages : 3 of 4

**Result of calibration : Photometric Accuracy**

| Material                     | Wavelength (nm) | Filter S/N | Nominal Absorbance (A) | Certified Absorbance (A) | UUC* Reading Absorbance (A) | Error (A) | Uncertainty ± (A) | k Factor |
|------------------------------|-----------------|------------|------------------------|--------------------------|-----------------------------|-----------|-------------------|----------|
| Neutral Density glass filter | 440.0           | 29381      | 0.5                    | 0.5443                   | 0.5413                      | -0.0030   | 0.0043            | 2.00     |
|                              |                 | 29914      | 0.7                    | 0.7484                   | 0.7455                      | -0.0029   | 0.0054            | 2.00     |
|                              |                 | 29360      | 1.0                    | 1.0527                   | 1.0535                      | 0.0008    | 0.0032            | 2.00     |
|                              | 465.0           | 29381      | 0.5                    | 0.4948                   | 0.4922                      | -0.0026   | 0.0041            | 2.00     |
|                              |                 | 29914      | 0.7                    | 0.6906                   | 0.6877                      | -0.0029   | 0.0050            | 2.00     |
|                              |                 | 29360      | 1.0                    | 0.9695                   | 0.9709                      | 0.0014    | 0.0031            | 2.00     |
|                              | 546.1           | 29381      | 0.5                    | 0.5090                   | 0.5068                      | -0.0022   | 0.0036            | 2.00     |
|                              |                 | 29914      | 0.7                    | 0.6985                   | 0.6960                      | -0.0025   | 0.0041            | 2.00     |
|                              |                 | 29360      | 1.0                    | 0.9814                   | 0.9825                      | 0.0011    | 0.0031            | 2.00     |
|                              | 590.0           | 29381      | 0.5                    | 0.5375                   | 0.5353                      | -0.0022   | 0.0034            | 2.00     |
|                              |                 | 29914      | 0.7                    | 0.7256                   | 0.7231                      | -0.0025   | 0.0037            | 2.00     |
|                              |                 | 29360      | 1.0                    | 1.0213                   | 1.0219                      | 0.0006    | 0.0032            | 2.00     |
|                              | 635.0           | 29381      | 0.5                    | 0.5223                   | 0.5202                      | -0.0021   | 0.0033            | 2.00     |
|                              |                 | 29914      | 0.7                    | 0.6927                   | 0.6901                      | -0.0026   | 0.0036            | 2.00     |
|                              |                 | 29360      | 1.0                    | 0.9744                   | 0.9750                      | 0.0006    | 0.0032            | 2.00     |

UUC\* = Unit Under Calibration

Michael B.

Cert. No. : SP25026  
Job No. : VC68SP0019  
Pages : 4 of 4

**Result of calibration : Photometric Accuracy**

(Without adjustment)

| Material                          | Wavelength<br>(nm) | Solution<br>(mg/l) | Certified<br>Absorbance (A) | UUC* Reading<br>Absorbance (A) | Error<br>(A) | Uncertainty<br>± (A) | k<br>Factor |
|-----------------------------------|--------------------|--------------------|-----------------------------|--------------------------------|--------------|----------------------|-------------|
| Potassium<br>dichromate solutions | 235.0              | 20                 | 0.2415                      | 0.2443                         | 0.0028       | 0.0101               | 2.00        |
|                                   |                    | 40                 | 0.4866                      | 0.4871                         | 0.0005       | 0.0115               | 2.00        |
|                                   |                    | 60                 | 0.7415                      | 0.7295                         | -0.0120      | 0.0067               | 2.00        |
|                                   |                    | 80                 | 0.9854                      | 0.9844                         | -0.0010      | 0.0071               | 2.00        |
|                                   |                    | 100                | 1.2444                      | 1.2425                         | -0.0019      | 0.0073               | 2.00        |

UUC\* = Unit Under Calibration

**Condition of this result of calibration : Spectrophotometer PERKINELMER Model LAMBDA 25 S/N 501S14123010**

Resolution of Wavelength Mode 0.1 nm

Resolution of Photometric Mode 0.001 A

**Parameter Setting**

Measurement Mode Wavelength, Absorbance

Wavelength Scan 190 nm - 1100 nm

Scanning Speed 7.5 nm/min

Band width(Wavelength) 1.0

Band width(Vis) 1.0

Band width(Uv) 1.0

| Stray Light** UUC* Reading at 220.0 nm |               |
|----------------------------------------|---------------|
| Transimission T(%)                     | Absorbance(A) |
| 0.020                                  | 3.7032        |

\*\*Specific Acceptance :

Transmission ≤ 1.0 T(%), Absorbance ≥ 2.0 A

\*\*Stray light not TISI Accredited

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

————— **End of Calibration Certificate** —————

### เอกสารที่ 5-3

เอกสารสอบเทียบเครื่องมือการตรวจคุณภาพอากาศ  
ในสถานประกอบการ (Working Area)



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด  
S.P.S. CONSULTING SERVICE CO., LTD.  
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900  
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900  
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

Temperature : 25 ± 3 °C  
Pressure : 1010 ± 15 mmbar

| Personal Pump Data |       |           |            |            | Calibration Data   |       |       |                 |       |       |                              |                |
|--------------------|-------|-----------|------------|------------|--------------------|-------|-------|-----------------|-------|-------|------------------------------|----------------|
| No.                | Brand | Model     | Serial No. | Date       | Flow Rate (ml/min) |       |       |                 |       |       | Value From Calibration Curve |                |
|                    |       |           |            |            | Setting            |       |       | Actual (Q std.) |       |       | y                            | R <sup>2</sup> |
|                    |       |           |            |            | 1                  | 2     | 3     | 1               | 2     | 3     |                              |                |
| B41                | SKC   | 224-PCXR4 | 612669     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 996             | 1,498 | 1,991 | 1.006x - 15.132              | 0.999          |
| B42                | SKC   | 224-PCXR4 | 626041     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 998             | 1,495 | 1,998 | 1.001x - 5.029               | 1.000          |
| B43                | SKC   | 224-PCXR4 | 034636     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 996             | 1,512 | 1,995 | 1.000x - 4.272               | 0.999          |
| B44                | SKC   | 224-PCXR8 | 529341     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 1,000           | 1,501 | 2,000 | 0.999x + 0.802               | 1.000          |
| B45                | SKC   | 224-PCXR8 | 529594     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 996             | 1,495 | 1,999 | 1.003x - 8.918               | 1.000          |
| B46                | SKC   | 224-PCXR8 | 565743     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 998             | 1,501 | 1,992 | 1.006x - 12.300              | 0.999          |
| B47                | SKC   | 224-PCXR8 | 566747     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 996             | 1,505 | 2,000 | 1.004x - 8.392               | 1.000          |
| B48                | SKC   | 224-PCXR8 | 566753     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 1,011           | 1,508 | 2,008 | 0.998x + 4.726               | 0.999          |
| B49                | SKC   | 224-PCXR8 | 566780     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 997             | 1,495 | 1,999 | 1.003x - 8.045               | 1.000          |
| B50                | SKC   | 224-PCXR8 | 500400     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 1,000           | 1,499 | 1,994 | 0.996x + 3.406               | 1.000          |
| B51                | SKC   | 224-PCXR8 | 500363     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 997             | 1,505 | 1,997 | 1.005x - 14.055              | 0.999          |
| B52                | SKC   | 224-PCXR8 | 093186     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 996             | 1,506 | 2,000 | 1.002x - 5.484               | 1.000          |
| B53                | SKC   | 224-PCXR8 | 707670     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 993             | 1,505 | 2,001 | 1.009x - 20.477              | 0.999          |
| B54                | SKC   | 224-PCXR3 | 509821     | 06/04/2026 | 1,000              | 1,500 | 2,000 | 1,005           | 1,500 | 2,008 | 1.007x - 10.015              | 1.000          |
| B55                | SKC   | 224-PCXR3 | 510710     | 06/04/2026 | 1,000              | 1,500 | 2,000 | 1,013           | 1,502 | 2,007 | 1.002x - 2.573               | 0.999          |
| B56                | SKC   | 224-PCXR3 | 511450     | 06/04/2026 | 1,000              | 1,500 | 2,000 | 992             | 1,492 | 1,999 | 1.004x - 10.669              | 1.000          |
| B57                | SKC   | 224-PCXR3 | 510798     | 06/04/2026 | 1,000              | 1,500 | 2,000 | 999             | 1,496 | 1,996 | 0.998x - 0.463               | 1.000          |
| B58                | SKC   | 224-PCXR3 | 509852     | 06/04/2026 | 1,000              | 1,500 | 2,000 | 1,003           | 1,499 | 1,999 | 0.996x + 4.204               | 1.000          |
| B59                | SKC   | 224-PCXR3 | 509862     | 06/04/2026 | 1,000              | 1,500 | 2,000 | 1,000           | 1,500 | 1,998 | 0.998x + 0.850               | 1.000          |
| B60                | SKC   | 224-PCXR3 | 512655     | 06/04/2026 | 1,000              | 1,500 | 2,000 | 997             | 1,506 | 2,002 | 1.003x - 8.264               | 0.999          |
| B61                | SKC   | 224-PCXR3 | 503913     | 06/04/2026 | 1,000              | 1,500 | 2,000 | 999             | 1,505 | 2,006 | 1.004x - 6.792               | 1.000          |
| B62                | SKC   | 224-PCXR3 | 505975     | 06/04/2026 | 1,000              | 1,500 | 2,000 | 998             | 1,504 | 2,004 | 1.005x - 10.095              | 1.000          |
| B63                | SKC   | 224-PCXR3 | 511432     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 999             | 1,500 | 1,997 | 0.999x - 2.345               | 1.000          |
| B64                | SKC   | 224-PCXR3 | 508302     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 1,001           | 1,491 | 1,996 | 0.997x + 0.511               | 1.000          |
| B65                | SKC   | 224-PCXR3 | 508310     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 1,002           | 1,509 | 1,994 | 1.000x - 4.906               | 0.999          |
| B66                | SKC   | 224-PCXR3 | 509861     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 995             | 1,501 | 2,004 | 1.008x - 15.001              | 1.000          |
| B67                | SKC   | 224-PCXR3 | 506295     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 1,002           | 1,500 | 1,999 | 0.998x + 1.468               | 1.000          |
| B68                | SKC   | 224-PCXR3 | 505872     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 1,005           | 1,494 | 1,994 | 0.996x - 1.783               | 0.999          |
| B69                | SKC   | 224-PCXR3 | 508375     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 997             | 1,505 | 2,005 | 1.009x - 17.840              | 0.999          |
| B70                | SKC   | 224-PCXR3 | 510623     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 998             | 1,499 | 1,999 | 1.002x - 2.573               | 1.000          |
| B71                | SKC   | 224-PCXR3 | 508367     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 1,002           | 1,503 | 1,989 | 0.997x - 0.594               | 0.999          |
| B72                | SKC   | 224-PCXR3 | 505977     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 999             | 1,504 | 2,001 | 1.002x - 4.551               | 1.000          |
| B73                | SKC   | 224-PCXR3 | 512606     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 1,001           | 1,502 | 2,002 | 1.000x - 1.555               | 1.000          |
| B74                | SKC   | 224-PCXR3 | 505993     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 1,003           | 1,504 | 2,008 | 1.006x - 6.832               | 1.000          |
| B75                | SKC   | 224-PCXR3 | 509820     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 1,002           | 1,503 | 1,990 | 1.002x - 9.465               | 0.999          |
| B76                | SKC   | 224-PCXR3 | 509811     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 1,001           | 1,500 | 2,002 | 1.001x - 2.688               | 1.000          |
| B77                | SKC   | 224-PCXR3 | 508301     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 999             | 1,501 | 1,996 | 0.998x + 0.550               | 1.000          |
| B78                | SKC   | 224-PCXR3 | 510677     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 1,000           | 1,496 | 1,997 | 1.000x - 3.151               | 1.000          |
| B79                | SKC   | 224-PCXR3 | 510920     | 09/04/2026 | 1,000              | 1,500 | 2,000 | 1,002           | 1,502 | 1,986 | 0.997x - 2.026               | 0.999          |



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด  
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7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900  
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900  
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

Temperature : 25 ± 3 °C  
Pressure : 1010 ± 15 mmbar

| Personal Pump Data |       |           |            |            | Calibration Data   |       |       |                 |       |       |                              |                |
|--------------------|-------|-----------|------------|------------|--------------------|-------|-------|-----------------|-------|-------|------------------------------|----------------|
| No.                | Brand | Model     | Serial No. | Date       | Flow Rate (ml/min) |       |       |                 |       |       | Value From Calibration Curve |                |
|                    |       |           |            |            | Setting            |       |       | Actual (Q std.) |       |       | y                            | R <sup>2</sup> |
|                    |       |           |            |            | 1                  | 2     | 3     | 1               | 2     | 3     |                              |                |
| B80                | SKC   | 224-PCXR3 | 504569     | 01/04/2026 | 1,000              | 1,500 | 2,000 | 1,002           | 1,500 | 2,002 | 0.999x - 1.161               | 1.000          |
| B81                | SKC   | 224-PCXR3 | 503480     | 01/04/2026 | 1,000              | 1,500 | 2,000 | 993             | 1,497 | 1,991 | 0.997x - 0.040               | 1.000          |
| B82                | SKC   | 224-PCXR3 | 505673     | 01/04/2026 | 1,000              | 1,500 | 2,000 | 1,001           | 1,501 | 1,986 | 0.996x + 2.864               | 0.999          |
| B83                | SKC   | 224-PCXR3 | 510785     | 01/04/2026 | 1,000              | 1,500 | 2,000 | 1,009           | 1,500 | 1,993 | 0.994x + 6.437               | 0.999          |
| B84                | SKC   | 224-PCXR3 | 508333     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 1,003           | 1,502 | 1,990 | 0.999x - 3.542               | 0.999          |
| B85                | SKC   | 224-PCXR3 | 505757     | 01/04/2026 | 1,000              | 1,500 | 2,000 | 1,004           | 1,499 | 2,001 | 0.996x + 5.197               | 1.000          |
| B86                | SKC   | 224-PCXR3 | 512625     | 01/04/2026 | 1,000              | 1,500 | 2,000 | 1,001           | 1,502 | 1,997 | 0.997x + 1.603               | 1.000          |
| B87                | SKC   | 224-PCXR3 | 504324     | 01/04/2026 | 1,000              | 1,500 | 2,000 | 1,002           | 1,492 | 2,001 | 0.999x - 1.855               | 1.000          |
| B88                | SKC   | 224-PCXR3 | 508307     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 1,011           | 1,501 | 2,003 | 0.997x + 4.084               | 0.999          |
| B89                | SKC   | 224-PCXR3 | 509860     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 999             | 1,502 | 1,991 | 1.005x - 10.506              | 0.999          |
| B90                | SKC   | 224-PCXR3 | 508366     | 01/04/2026 | 1,000              | 1,500 | 2,000 | 998             | 1,500 | 2,002 | 1.003x - 5.376               | 1.000          |
| B91                | SKC   | 224-PCXR3 | 510919     | 01/04/2026 | 1,000              | 1,500 | 2,000 | 1,003           | 1,499 | 2,004 | 1.002x - 4.399               | 1.000          |
| B92                | SKC   | 224-PCXR3 | 510987     | 01/04/2026 | 1,000              | 1,500 | 2,000 | 997             | 1,495 | 2,000 | 1.004x - 9.780               | 1.000          |
| B93                | SKC   | 224-PCXR3 | 509845     | 03/04/2026 | 1,000              | 1,500 | 2,000 | 1,003           | 1,503 | 1,998 | 0.997x + 3.219               | 1.000          |



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด  
S.P.S. CONSULTING SERVICE CO., LTD.  
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900  
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900  
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscn.com, www.spscn.com

Rotameter Calibration Report (For Personal Pump High Flow Adjust)

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Calibration Data

| Rotameter Data |       |        | Calibration Data |                     |       |       |                 |        |        |                              |                |
|----------------|-------|--------|------------------|---------------------|-------|-------|-----------------|--------|--------|------------------------------|----------------|
| No.            | Brand | Model  | Date             | Flow Rate (mL/min)  |       |       |                 |        |        | Value From Calibration Curve |                |
|                |       |        |                  | Flow Rate (Reading) |       |       | Actual (Q std.) |        |        |                              |                |
|                |       |        |                  | 1                   | 2     | 3     | 1               | 2      | 3      | y                            | R <sup>2</sup> |
| H-801          | Dwyer | VFB-65 | 01/04/2026       | 500                 | 1,000 | 2,000 | 500.8           | 997.7  | 1994.6 | 0.997x + 1.368               | 1.000          |
| H-802          | Dwyer | VFB-65 | 01/04/2026       | 500                 | 1,000 | 2,000 | 500.9           | 997.0  | 1994.3 | 0.998x + 0.689               | 1.000          |
| H-803          | Dwyer | VFB-65 | 01/04/2026       | 500                 | 1,000 | 2,000 | 499.5           | 999.8  | 1997.2 | 0.999x - 0.227               | 1.000          |
| H-804          | Dwyer | VFB-65 | 02/04/2026       | 500                 | 1,000 | 2,000 | 499.4           | 1000.9 | 2000.3 | 1.000x - 1.929               | 0.999          |
| H-805          | Dwyer | VFB-65 | 02/04/2026       | 500                 | 1,000 | 2,000 | 499.0           | 999.6  | 1998.7 | 1.001x + 0.053               | 1.000          |
| H-806          | Dwyer | VFB-65 | 02/04/2026       | 500                 | 1,000 | 2,000 | 499.8           | 998.0  | 1996.5 | 0.998x + 0.698               | 1.000          |
| H-807          | Dwyer | VFB-65 | 01/04/2026       | 500                 | 1,000 | 2,000 | 500.1           | 1000.8 | 1996.2 | 0.999x + 2.423               | 0.999          |
| H-808          | Dwyer | VFB-65 | 01/04/2026       | 500                 | 1,000 | 2,000 | 499.8           | 1000.1 | 1997.6 | 0.999x - 0.675               | 1.000          |
| H-809          | Dwyer | VFB-65 | 06/04/2026       | 500                 | 1,000 | 2,000 | 499.6           | 1002.1 | 2002.4 | 1.001x - 6.068               | 0.999          |
| H-810          | Dwyer | VFB-65 | 06/04/2026       | 500                 | 1,000 | 2,000 | 500.4           | 1001.6 | 1999.6 | 0.999x + 1.475               | 1.000          |



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



PAGE : 1 OF 2

CERTIFICATE No : 26M2266  
REFERENCE No : 80204-1

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE  
MANUFACTURER : METTLER TOLEDO  
MODEL : XS105DU  
SERIAL No : 1126422905  
ID No : BA 05/50  
CONDITION AS RECEIVED : USED ITEM  
SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.  
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,  
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY :   
CALIBRATION DATE : 05-Mar-26

APPROVED BY :   
ISSUED DATE : 06-Mar-26  
RECEIVED DATE : 05-Mar-26

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





CERTIFICATE No : 26M2266

PAGE : 2 OF 2

## Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : XS105DU  
MANUFACTURER : METTLER TOLEDO S/N : 1126422905  
ID No : BA 05/50 RECEIVED DATE : 05-Mar-26  
AIR PRESSURE : 1004mbar  $\pm$  1mbar CALIBRATION DATE : 05-Mar-26  
AMBIENT TEMPERATURE : 25° C  $\pm$  1° C RELATIVE HUMIDITY : 50 %RH  $\pm$  10 % RH

### CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS NOT ADJUSTED BEFORE CALIBRATION. THE BALANCE HAS NO ZERO TRACKING FUNCTION. REPEATABILITY WAS MEASURED BY USING 10 REPEATED MEASUREMENTS. LINEARITY WAS MEASURED COVERING 10 POINTS, EVENLY SPREAD OVER THE RANGE. THE INSTRUMENT WAS SET ZERO BEFORE PERFORMING THE LINEARITY TEST. OFF-CENTER LOADING WAS MEASURED BY USING STANDARD WEIGHTS PLACED ON THE PAN AND MOVED TO VARIOUS POSITIONS ON THE PAN.

### 2. REFERENCE STANDARD INSTRUMENTS :-

|                        | <u>INSTRUMENT</u> | <u>MODEL</u> | <u>SERIAL No</u> | <u>CERTIFICATE No</u> | <u>DUE DATE</u> |
|------------------------|-------------------|--------------|------------------|-----------------------|-----------------|
| 1) STANDARD WEIGHT SET | E2                | QK-I-151     | C02250116        | 28-Jan-27             |                 |
| 2) STANDARD WEIGHT     | E2                | 15843        | C02250117        | 29-Jan-27             |                 |

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.

4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

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

- NATIONAL INSTITUTE OF METROLOGY (THAILAND)

### RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL

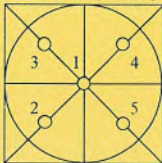
2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 120 g WAS 0.000055 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

| NOMINAL VALUE (g) | BALANCE READING (g) | CORRECTION (g) | UNCERTAINTY ( $\pm$ g) |
|-------------------|---------------------|----------------|------------------------|
| 0.00              | 0.00000             | 0.00000        | 0.000065               |
| 0.02              | 0.02000             | 0.00000        | 0.000065               |
| 0.10              | 0.10000             | 0.00000        | 0.000066               |
| 0.20              | 0.20000             | 0.00000        | 0.000066               |
| 0.50              | 0.50001             | -0.00001       | 0.000065               |
| 1.00              | 1.00001             | -0.00001       | 0.000066               |
| 2.00              | 2.00000             | 0.00000        | 0.000067               |
| 5.00              | 5.00001             | -0.00001       | 0.000068               |
| 10.00             | 10.00004            | -0.00004       | 0.000070               |
| 20.00             | 20.00006            | -0.00006       | 0.000078               |
| 50.00             | 50.00000            | 0.00000        | 0.00012                |
| 100.00            | 100.0002            | -0.0002        | 0.00019                |
| 120.00            | 120.0002            | -0.0002        | 0.00022                |

### 5. OFF CENTER LOADING ERROR



| POINT              | READING (g) |
|--------------------|-------------|
| 1                  | 50.0000     |
| 2                  | 50.0000     |
| 3                  | 50.0000     |
| 4                  | 50.0000     |
| 5                  | 50.0000     |
| OFF-CENTER LOADING | 0.0000      |

NOTE: THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA  
THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR  $k=2$ , PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



### เอกสารที่ 5-4

เอกสารสอบเทียบเครื่องมือการตรวจระดับเสียงโดยทั่วไป  
และเสียงในสถานประกอบการ (Working Area)



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-69/0204

MTC No. EEL. BP. 152/0169

## CALIBRATION CERTIFICATE

Submitted by : S.P.S.CONSULTING SERVICE CO.,LTD.

Address : 7 Soi Phaholyothin 24, Phaholyothin Road, Jompol, Chatuchak, Bangkok 10900.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.  
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

### Instrument Calibrated :

Description : Sound Calibrator

Manufacturer : ACO

Model : 2127

Serial No. : 130006

### Ambient Environment

Temperature : (23 + 3) °C

Relative Humidity : (50 ± 15) %

Ambient Pressure : (101.325 ± 1.500) kPa

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.

2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.

3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.

4. Digital Multimeter Agilent 34401A S/N MY44005560.

5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.

6. Audio Analyzer Keithley 2015-P S/N 4106495.

7. Condenser Microphone Bruel&Kjaer 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942-2003; The sound pressure level generated by sound calibrator under test shall be measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 29 Jan. 2026

Date of Calibration : 11 Feb. 2026

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BL.MTC.002 Rev.5

Head Office  
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,  
Changwat Pathumthani 12120, Thailand  
Tel. (66) 0 2577 9036  
Fax. (66) 0 2577 9009

Office/Laboratory  
668 Mu 2 Tambon Bangpoomai, Amphoe Muang Samutprakan,  
Changwat Samutprakan 10280, Thailand  
Tel. (66) 0 2323 1672-80 ext. 115, 116  
(66) 08 3219 9440  
E-mail : mtc@tistr.or.th Website : www.tistr.or.th

Office  
196 Phahonyothin Road, Ladyao, Chatuchak,  
Bangkok 10900, Thailand  
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217  
(66) 08 1889 6827



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-69/0204

MTC No. EEL. BP. 152/0169

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

Nominal Output of Unit Under Test = 94 dB re 20µPa at 1000 Hz

Acoustic Output in dB re 20µPa, Corrected to Reference Conditions: 101.325 kPa, 23.0 °C and 50 %RH.

### 1. Sound Pressure Level

| Standard Microphone<br>Type | Measured Sound Pressure<br>Level (dB) | Deviated value<br>(dB) | Uncertainty<br>(dB) | Tolerance limit<br>IEC60942:2003 Class 1 |
|-----------------------------|---------------------------------------|------------------------|---------------------|------------------------------------------|
| 1/2 inch Bruel&Kjaer 4180   | 93.89                                 | -0.11                  | ± 0.10              | ±0.40 dB                                 |

### 2. Frequency

| Standard Microphone<br>Type | Measured Frequency<br>(Hz) | Deviated value<br>(Hz) | Uncertainty<br>(Hz) | Tolerance limit<br>IEC60942:2003 Class 1 |
|-----------------------------|----------------------------|------------------------|---------------------|------------------------------------------|
| 1/2 inch Bruel&Kjaer 4180   | 999.9                      | -0.1                   | ± 1.5               | ±1.0%                                    |

### 3. Total Distortion

| Standard Microphone<br>Type | Measured Total Distortion<br>(%) | Uncertainty<br>(%) | Tolerance limit<br>IEC60942:2003 Class 1 |
|-----------------------------|----------------------------------|--------------------|------------------------------------------|
| 1/2 inch Bruel&Kjaer 4180   | 1.90                             | ± 0.50             | ±3.0%                                    |

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

Approved by :

Date of Calibration : 11 Feb. 2026

Date of Issue : 12 Feb. 2026

Electrical and Electronic Standards Laboratory  
Industrial Metrology and Testing Service Centre

Ref : 2011269012900497001

End of Certificate

2 / 2

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BL.MTC.002 Rev.5

Head Office  
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Bangkok 10900, Thailand  
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217  
(66) 08 1889 6827

Noise B\_216/26

### Sound Level Meter Calibration Report

| Acoustic Calibrator Data |                |  |                  |                  |  |  |
|--------------------------|----------------|--|------------------|------------------|--|--|
| Brand                    | ACO            |  | Number           | AC 03/56         |  |  |
| Model                    | 2127           |  | Serial No.       | 130006           |  |  |
| Calibration Range        | 94 dB, 1000 Hz |  | Last Calibration | 11 February 2026 |  |  |
|                          |                |  | Due Date         | 11 February 2027 |  |  |

| Calibration Data                                                                               |         |        |            |                  |                     |                  |
|------------------------------------------------------------------------------------------------|---------|--------|------------|------------------|---------------------|------------------|
| Sound Level Meter Data                                                                         |         |        |            | Calibration Data |                     |                  |
| SLM No.                                                                                        | Brand   | Model  | Serial No. | Date             | Actual Reading [dB] |                  |
|                                                                                                |         |        |            |                  | Before Adjustment   | After Adjustment |
| ST-C1-B06                                                                                      | SCARLET | ST-12D | 10351461   | 27 April 2026    | 93.9                | 93.9             |
| ST-C1-B07                                                                                      | SCARLET | ST-12D | 10351464   | 27 April 2026    | 93.8                | 93.9             |
| ST-C1-B08                                                                                      | SCARLET | ST-12D | 10351469   | 27 April 2026    | 93.9                | 93.9             |
| Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR) |         |        |            |                  | 93.89 ± 0.10 dB     |                  |

Noise B\_307/26

### Sound Level Meter Calibration Report

| Acoustic Calibrator Data |                |  |                  |                  |  |  |
|--------------------------|----------------|--|------------------|------------------|--|--|
| Brand                    | ACO            |  | Number           | AC 03/56         |  |  |
| Model                    | 2127           |  | Serial No.       | 130006           |  |  |
| Calibration Range        | 94 dB, 1000 Hz |  | Last Calibration | 11 February 2026 |  |  |
|                          |                |  | Due Date         | 11 February 2027 |  |  |

| Calibration Data                                                                               |       |       |            |                  |                     |                  |
|------------------------------------------------------------------------------------------------|-------|-------|------------|------------------|---------------------|------------------|
| Sound Level Meter Data                                                                         |       |       |            | Calibration Data |                     |                  |
| SLM No.                                                                                        | Brand | Model | Serial No. | Date             | Actual Reading [dB] |                  |
|                                                                                                |       |       |            |                  | Before Adjustment   | After Adjustment |
| ACO-B44                                                                                        | ACO   | 6236  | 00222302   | 04 June 2026     | 93.7                | 93.9             |
| ACO-B45                                                                                        | ACO   | 6236  | 00222304   | 04 June 2026     | 93.8                | 93.9             |
| ACO-B46                                                                                        | ACO   | 6236  | 00222305   | 04 June 2026     | 93.9                | 93.9             |
| Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR) |       |       |            |                  | 93.89 ± 0.10 dB     |                  |

## เอกสารที่ 5-5

เอกสารสอบเทียบเครื่องมือการตรวจค่าความร้อน  
ในสถานประกอบการ (Working Area)



## Certificate of Calibration

Certificate Number : SPR25110089-4 Page : 1 of 3

Customer : S.P.S. CONSULTING SERVICE CO., LTD.  
7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,  
Bangkok 10900

Equipment Name : Area Heat Stress Monitor  
Manufacturer : Quest Technologies  
Model : QUESTemp 32  
Serial Number : TPH050047  
ID. Number : B31  
Environmental Conditions  
Ambient Temperature : 23 °C ± 2 °C Received Date : 07 Nov 2025  
Relative Humidity : 50 % ± 15 % Calibration Date : 01 Dec 2025  
Location of Calibration : In-Lab Recommend Due Date : 01 Dec 2026  
Calibration Procedure : SP-CPT-04-13 Date of Issue : 02 Dec 2025

### Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by :

Approved by



## Calibration Report

Certificate Number : SPR25110089-4 Page : 2 of 3

### Reference Standards

| Equipment Name               | Model               | Serial No.      | Certificate No. | Due. Date   |
|------------------------------|---------------------|-----------------|-----------------|-------------|
| THERMO-HYGROMETER            | 5020A               | A47046          | TMU2500342      | 29 Jan 2026 |
| Temp & Humidity Test Chamber | TEMI1500-01/SD/N/N/ | S7110ZL742 1014 | SPR25040010-13  | 20 Apr 2026 |

### Traceability

This certification is traceable to the International System of Unit maintained at :  
NA - NA Caltechnologies Co., Ltd.  
SP Metrology - SP Metrology system (Thailand) Co.Ltd.



## Result of Calibration

Certificate Number : SPR25110089-4

Page : 3 of 3

Temperature Accuracy in the Measurement. (WET)

Unit : °C

| Temperature Setting | Standard Reading | UUC Reading | Error  | Uncertainty ( ± ) |
|---------------------|------------------|-------------|--------|-------------------|
| 30.0                | 30.006           | 29.5        | -0.506 | 0.20              |
| 35.0                | 35.009           | 34.6        | -0.409 | 0.20              |
| 40.0                | 40.008           | 39.5        | -0.508 | 0.21              |

Temperature Accuracy in the Measurement. (DRY)

Unit : °C

| Temperature Setting | Standard Reading | UUC Reading | Error  | Uncertainty ( ± ) |
|---------------------|------------------|-------------|--------|-------------------|
| 30.0                | 30.006           | 29.5        | -0.506 | 0.20              |
| 35.0                | 35.009           | 34.6        | -0.409 | 0.20              |
| 40.0                | 40.008           | 39.6        | -0.408 | 0.21              |

Temperature Accuracy in the Measurement. (GLOVE)

Unit : °C

| Temperature Setting | Standard Reading | UUC Reading | Error  | Uncertainty ( ± ) |
|---------------------|------------------|-------------|--------|-------------------|
| 30.0                | 30.006           | 29.6        | -0.406 | 0.20              |
| 35.0                | 35.009           | 34.7        | -0.309 | 0.20              |
| 40.0                | 40.008           | 39.7        | -0.308 | 0.21              |

### Note :

The result of calibration was found accurate as show on date and place of calibration only.  
This Certificate is not certified for any commercial transaction.

### Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor k = 2, providing a level of confidence approximately 95%.

- End of Certificate -



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด

S.P.S. CONSULTING SERVICE CO., LTD.

7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900

7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900

Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

Heat B\_217\_1

| Heat Stress WBGT Meter Verification Report                           |                          |                       |                      |
|----------------------------------------------------------------------|--------------------------|-----------------------|----------------------|
| Verification Data                                                    |                          |                       |                      |
| Heat Stress WBGT Meter No. :                                         | B31                      | Verification Date :   | 27 April 2026        |
| Brand :                                                              | Quest Technologies       | Ambient Temp. :       | 24.5 °C              |
| Model :                                                              | QUESTemp <sup>0</sup> 32 | Barometric Pressure : | 1011 mmbar           |
| Serial No. :                                                         | TPH050047                | Relative Humidity :   | 49 %                 |
| Verification Module (Electronic Sensor Check) :                      |                          |                       |                      |
| Verification Module No. : 21 WB = 12.5 °C, DB = 47.1 °C, G = 69.3 °C |                          |                       |                      |
| Result of Verification : Without Adjustment                          |                          |                       |                      |
| Wet Probe Temperature Measurement                                    |                          |                       |                      |
| Verification Module Reading (°C)                                     | UUC* Reading (°C)        | Correction (°C)       | Tolerance Limit (°C) |
| 12.5                                                                 | 12.6                     | -0.1                  | ± 0.5                |
| Dry Probe Temperature Measurement                                    |                          |                       |                      |
| Verification Module Reading (°C)                                     | UUC* Reading (°C)        | Correction (°C)       | Tolerance Limit (°C) |
| 47.1                                                                 | 47.3                     | -0.2                  | ± 0.5                |
| Globe Probe Temperature Measurement                                  |                          |                       |                      |
| Verification Module Reading (°C)                                     | UUC* Reading (°C)        | Correction (°C)       | Tolerance Limit (°C) |
| 69.3                                                                 | 69.2                     | 0.1                   | ± 0.5                |
| UUC* = UNIT UNDER CALIBRATION                                        |                          |                       |                      |



## Certificate of Calibration

Certificate Number : SPR26010387-4

Page : 1 of 3

Customer : S.P.S. CONSULTING SERVICE CO., LTD.

7 Soi Paholyothin 24 Paholyothin Road., Jompol, Chatuchak,  
Bangkok 10900

Equipment Name : Area Heat Stress Monitor

Manufacturer : Quest Technologies

Model : QUESTemp 32

Serial Number : TPH050015

ID. Number : B32

### Environmental Conditions

Ambient Temperature : 23 °C ± 2 °C

Received Date : 30 Jan 2026

Relative Humidity : 50 % ± 15 %

Calibration Date : 03 Feb 2026

Location of Calibration : In-Lab

Recommend Due Date : 03 Feb 2027

Calibration Procedure : SP-CPT-04-13

Date of Issue : 04 Feb 2026

### Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).



## Calibration Report

Certificate Number : SPR26010387-4

Page : 2 of 3

### Reference Standards

| Equipment Name               | Model               | Serial No.      | Certificate No. | Due. Date   |
|------------------------------|---------------------|-----------------|-----------------|-------------|
| THERMO-HYGROMETER            | 5020A               | A47046          | TMU2500342      | 29 Jan 2027 |
| Temp & Humidity Test Chamber | TEMI1500-01/SD/N/N/ | S7110ZL742 1014 | SPR25040010-13  | 20 Apr 2026 |

### Traceability

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

NA - NA Caltechnologies Co., Ltd.

SP Metrology - SP Metrology system (Thailand) Co.Ltd.



## Result of Calibration

Certificate Number : SPR26010387-4

Page : 3 of 3

Temperature Accuracy in the Measurement. (WET)

Unit : °C

| Temperature Setting | Standard Reading | UUC Reading | Error  | Uncertainty ( ± ) |
|---------------------|------------------|-------------|--------|-------------------|
| 30.0                | 30.009           | 29.8        | -0.209 | 0.20              |
| 35.0                | 35.012           | 34.8        | -0.212 | 0.20              |
| 40.0                | 40.017           | 39.8        | -0.217 | 0.21              |

Temperature Accuracy in the Measurement. (DRY)

Unit : °C

| Temperature Setting | Standard Reading | UUC Reading | Error  | Uncertainty ( ± ) |
|---------------------|------------------|-------------|--------|-------------------|
| 30.0                | 30.009           | 29.9        | -0.109 | 0.20              |
| 35.0                | 35.012           | 34.9        | -0.112 | 0.20              |
| 40.0                | 40.017           | 39.9        | -0.117 | 0.21              |

Temperature Accuracy in the Measurement. (GLOBE)

Unit : °C

| Temperature Setting | Standard Reading | UUC Reading | Error | Uncertainty ( ± ) |
|---------------------|------------------|-------------|-------|-------------------|
| 30.0                | 30.009           | 30.1        | 0.091 | 0.20              |
| 35.0                | 35.012           | 35.1        | 0.088 | 0.20              |
| 40.0                | 40.017           | 40.1        | 0.083 | 0.21              |

### Note :

The result of calibration was found accurate as show on date and place of calibration only.  
This Certificate is not certified for any commercial transaction.

### Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor  $k = 2$ , providing a level of confidence approximately 95%.

- End of Certificate -



Heat B\_217\_2

| Heat Stress WBGT Meter Verification Report                           |                          |                       |                      |
|----------------------------------------------------------------------|--------------------------|-----------------------|----------------------|
| Verification Data                                                    |                          |                       |                      |
| Heat Stress WBGT Meter No. :                                         | B32                      | Verification Date :   | 27 April 2026        |
| Brand :                                                              | Quest Technologies       | Ambient Temp. :       | 24.5 °C              |
| Model :                                                              | QUESTemp <sup>o</sup> 32 | Barometric Pressure : | 1011 mmbar           |
| Serial No. :                                                         | TPH050015                | Relative Humidity :   | 49 %                 |
| Verification Module (Electronic Sensor Check) :                      |                          |                       |                      |
| Verification Module No. : 21 WB = 12.5 °C, DB = 47.1 °C, G = 69.3 °C |                          |                       |                      |
| Result of Verification : Without Adjustment                          |                          |                       |                      |
| Wet Probe Temperature Measurement                                    |                          |                       |                      |
| Verification Module Reading (°C)                                     | UUC* Reading (°C)        | Correction (°C)       | Tolerance Limit (°C) |
| 12.5                                                                 | 12.5                     | 0.0                   | ± 0.5                |
| Dry Probe Temperature Measurement                                    |                          |                       |                      |
| Verification Module Reading (°C)                                     | UUC* Reading (°C)        | Correction (°C)       | Tolerance Limit (°C) |
| 47.1                                                                 | 47.2                     | -0.1                  | ± 0.5                |
| Globe Probe Temperature Measurement                                  |                          |                       |                      |
| Verification Module Reading (°C)                                     | UUC* Reading (°C)        | Correction (°C)       | Tolerance Limit (°C) |
| 69.3                                                                 | 69.2                     | 0.1                   | ± 0.5                |
| UUC* = UNIT UNDER CALIBRATION                                        |                          |                       |                      |



## Certificate of Calibration

Certificate Number : SPR25100063-10 Page : 1 of 3

Customer : S.P.S. CONSULTING SERVICE CO., LTD.  
7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,  
Bangkok 10900

Equipment Name : Area Heat Stress Monitor  
Manufacturer : Quest Technologies  
Model : QUESTemp 32  
Serial Number : TPA100010  
ID. Number : B12  
Environmental Conditions  
Ambient Temperature : 23 °C ± 2 °C Received Date : 06 Oct 2025  
Relative Humidity : 50 % ± 15 % Calibration Date : 29 Oct 2025  
Location of Calibration : In-Lab Recommend Due Date : 29 Oct 2026  
Calibration Procedure : SP-CPT-04-13 Date of Issue : 30 Oct 2025

### Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).



## Calibration Report

Certificate Number : SPR25100063-10 Page : 2 of 3

### Reference Standards

| Equipment Name               | Model               | Serial No.      | Certificate No. | Due. Date   |
|------------------------------|---------------------|-----------------|-----------------|-------------|
| THERMO-HYGROMETER            | 5020A               | A47046          | TMU2500342      | 29 Jan 2026 |
| Temp & Humidity Test Chamber | TEMI1500-01/SD/N/N/ | S7110ZL742 1014 | SPR25040010-13  | 20 Apr 2026 |

### Traceability

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

NA - NA Caltechnologies Co., Ltd.

SP Metrology - SP Metrology system (Thailand) Co.Ltd.



## Result of Calibration

Certificate Number : SPR25100063-10

Page : 3 of 3

Temperature Accuracy in the Measurement. (WET)

Unit : °C

| Temperature Setting | Standard Reading | UUC Reading | Error  | Uncertainty ( ± ) |
|---------------------|------------------|-------------|--------|-------------------|
| 30.0                | 30.019           | 30.1        | 0.081  | 0.20              |
| 35.0                | 35.013           | 35.1        | 0.087  | 0.20              |
| 40.0                | 40.009           | 40.0        | -0.009 | 0.21              |

Temperature Accuracy in the Measurement. (DRY)

Unit : °C

| Temperature Setting | Standard Reading | UUC Reading | Error  | Uncertainty ( ± ) |
|---------------------|------------------|-------------|--------|-------------------|
| 30.0                | 30.022           | 30.1        | 0.078  | 0.20              |
| 35.0                | 35.016           | 35.1        | 0.084  | 0.20              |
| 40.0                | 40.010           | 40.0        | -0.010 | 0.21              |

Temperature Accuracy in the Measurement. (GLOVE)

Unit : °C

| Temperature Setting | Standard Reading | UUC Reading | Error | Uncertainty ( ± ) |
|---------------------|------------------|-------------|-------|-------------------|
| 30.0                | 30.024           | 30.1        | 0.076 | 0.20              |
| 35.0                | 35.019           | 35.1        | 0.081 | 0.20              |
| 40.0                | 40.011           | 40.1        | 0.089 | 0.21              |

### Note :

The result of calibration was found accurate as show on date and place of calibration only.  
This Certificate is not certified for any commercial transaction.

### Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor k = 2, providing a level of confidence approximately 95%.

- End of Certificate -



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด

**S.P.S. CONSULTING SERVICE CO., LTD.**

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Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

Heat B\_308\_1

| Heat Stress WBGT Meter Verification Report                           |                            |                     |                      |
|----------------------------------------------------------------------|----------------------------|---------------------|----------------------|
| Verification Data                                                    |                            |                     |                      |
| Heat Stress WBGT Meter No.                                           | : B12                      | Verification Date   | : 12 June 2026       |
| Brand                                                                | : Quest Technologies       | Ambient Temp.       | : 24.5 °C            |
| Model                                                                | : QUESTemp <sup>o</sup> 32 | Barometric Pressure | : 1011 mmbar         |
| Serial No.                                                           | : TPA100010                | Relative Humidity   | : 49 %               |
| Verification Module (Electronic Sensor Check) :                      |                            |                     |                      |
| Verification Module No. : 21 WB = 12.5 °C, DB = 47.1 °C, G = 69.3 °C |                            |                     |                      |
| Result of Verification : Without Adjustment                          |                            |                     |                      |
| Wet Probe Temperature Measurement                                    |                            |                     |                      |
| Verification Module Reading (°C)                                     | UUC* Reading (°C)          | Correction (°C)     | Tolerance Limit (°C) |
| 12.5                                                                 | 12.6                       | -0.1                | ± 0.5                |
| Dry Probe Temperature Measurement                                    |                            |                     |                      |
| Verification Module Reading (°C)                                     | UUC* Reading (°C)          | Correction (°C)     | Tolerance Limit (°C) |
| 47.1                                                                 | 47.2                       | -0.1                | ± 0.5                |
| Globe Probe Temperature Measurement                                  |                            |                     |                      |
| Verification Module Reading (°C)                                     | UUC* Reading (°C)          | Correction (°C)     | Tolerance Limit (°C) |
| 69.3                                                                 | 69.2                       | 0.1                 | ± 0.5                |
| UUC* = UNIT UNDER CALIBRATION                                        |                            |                     |                      |



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www.สเปคเมทรีโลยีซิสเต็ม(ไทย) จำกัด



Certificate of Calibration

Certificate Number : SPR25100063-7 Page : 1 of 3

Customer : S.P.S. CONSULTING SERVICE CO., LTD.  
7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,  
Bangkok 10900

Equipment Name : Area Heat Stress Monitor  
Manufacturer : Quest Technologies  
Model : QUESTemp 34  
Serial Number : TEF050029  
ID. Number : B17  
Environmental Conditions  
Ambient Temperature : 23 °C ± 2 °C Received Date : 06 Oct 2025  
Relative Humidity : 50 % ± 15 % Calibration Date : 21 Oct 2025  
Location of Calibration : In-Lab Recommend Due Date : 21 Oct 2026  
Calibration Procedure : SP-CPT-04-13 Date of Issue : 22 Oct 2025

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).



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Calibration Report

Certificate Number : SPR25100063-7 Page : 2 of 3

Reference Standards

| Equipment Name               | Model               | Serial No.      | Certificate No. | Due. Date   |
|------------------------------|---------------------|-----------------|-----------------|-------------|
| THERMO-HYGROMETER            | 5020A               | A47046          | TMU2500342      | 29 Jan 2026 |
| Temp & Humidity Test Chamber | TEMI1500-01/SD/N/N/ | S7110ZL742 1014 | SPR25040010-13  | 20 Apr 2026 |

Traceability

This certification is traceable to the International System of Unit maintained at :  
NA - NA Caltechnologies Co., Ltd.  
SP Metrology - SP Metrology system (Thailand) Co.Ltd.



## Result of Calibration

Certificate Number : SPR25100063-7

Page : 3 of 3

Temperature Accuracy in the Measurement. (WET)

Unit : °C

| Temperature Setting | Standard Reading | UUC Reading | Error  | Uncertainty ( ± ) |
|---------------------|------------------|-------------|--------|-------------------|
| 30.0                | 30.007           | 29.9        | -0.107 | 0.20              |
| 35.0                | 35.009           | 34.9        | -0.109 | 0.20              |
| 40.0                | 40.005           | 39.9        | -0.105 | 0.21              |

Temperature Accuracy in the Measurement. (DRY)

Unit : °C

| Temperature Setting | Standard Reading | UUC Reading | Error | Uncertainty ( ± ) |
|---------------------|------------------|-------------|-------|-------------------|
| 30.0                | 30.007           | 30.2        | 0.193 | 0.20              |
| 35.0                | 35.009           | 35.2        | 0.191 | 0.20              |
| 40.0                | 40.005           | 40.2        | 0.195 | 0.21              |

Temperature Accuracy in the Measurement. (GLOVE)

Unit : °C

| Temperature Setting | Standard Reading | UUC Reading | Error  | Uncertainty ( ± ) |
|---------------------|------------------|-------------|--------|-------------------|
| 30.0                | 30.007           | 30.0        | -0.007 | 0.20              |
| 35.0                | 35.009           | 34.9        | -0.109 | 0.20              |
| 40.0                | 40.005           | 39.9        | -0.105 | 0.21              |

### Note :

The result of calibration was found accurate as show on date and place of calibration only.  
This Certificate is not certified for any commercial transaction.

### Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor  $k = 2$ , providing a level of confidence approximately 95%.

- End of Certificate -



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7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900  
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

Heat B\_308\_2

| Heat Stress WBGT Meter Verification Report                           |                          |                       |                      |
|----------------------------------------------------------------------|--------------------------|-----------------------|----------------------|
| Verification Data                                                    |                          |                       |                      |
| Heat Stress WBGT Meter No. :                                         | B17                      | Verification Date :   | 12 June 2026         |
| Brand :                                                              | Quest Technologies       | Ambient Temp. :       | 24.5 °C              |
| Model :                                                              | QUESTemp <sup>o</sup> 34 | Barometric Pressure : | 1011 mmbar           |
| Serial No. :                                                         | TEF050029                | Relative Humidity :   | 49 %                 |
| Verification Module (Electronic Sensor Check) :                      |                          |                       |                      |
| Verification Module No. : 21 WB = 12.5 °C, DB = 47.1 °C, G = 69.3 °C |                          |                       |                      |
| Result of Verification : Without Adjustment                          |                          |                       |                      |
| Wet Probe Temperature Measurement                                    |                          |                       |                      |
| Verification Module Reading (°C)                                     | UUC* Reading (°C)        | Correction (°C)       | Tolerance Limit (°C) |
| 12.5                                                                 | 12.6                     | -0.1                  | ± 0.5                |
| Dry Probe Temperature Measurement                                    |                          |                       |                      |
| Verification Module Reading (°C)                                     | UUC* Reading (°C)        | Correction (°C)       | Tolerance Limit (°C) |
| 47.1                                                                 | 47.2                     | -0.1                  | ± 0.5                |
| Globe Probe Temperature Measurement                                  |                          |                       |                      |
| Verification Module Reading (°C)                                     | UUC* Reading (°C)        | Correction (°C)       | Tolerance Limit (°C) |
| 69.3                                                                 | 69.2                     | 0.1                   | ± 0.5                |
| UUC* = UNIT UNDER CALIBRATION                                        |                          |                       |                      |



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# Certificate of Calibration

Certificate Number : SPR25110089-4 Page : 1 of 3

Customer : S.P.S. CONSULTING SERVICE CO., LTD.  
7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,  
Bangkok 10900

Equipment Name : Area Heat Stress Monitor  
Manufacturer : Quest Technologies  
Model : QUESTemp 32  
Serial Number : TPH050047  
ID. Number : B31  
Environmental Conditions  
Ambient Temperature : 23 °C ± 2 °C Received Date : 07 Nov 2025  
Relative Humidity : 50 % ± 15 % Calibration Date : 01 Dec 2025  
Location of Calibration : In-Lab Recommend Due Date : 01 Dec 2026  
Calibration Procedure : SP-CPT-04-13 Date of Issue : 02 Dec 2025

## Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).



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# Calibration Report

Certificate Number : SPR25110089-4 Page : 2 of 3

## Reference Standards

| Equipment Name               | Model               | Serial No.      | Certificate No. | Due. Date   |
|------------------------------|---------------------|-----------------|-----------------|-------------|
| THERMO-HYGROMETER            | 5020A               | A47046          | TMU2500342      | 29 Jan 2026 |
| Temp & Humidity Test Chamber | TEMI1500-01/SD/N/N/ | S7110ZL742 1014 | SPR25040010-13  | 20 Apr 2026 |

## Traceability

This certification is traceable to the International System of Unit maintained at :  
NA - NA Caltechnologies Co., Ltd.  
SP Metrology - SP Metrology system (Thailand) Co.Ltd.



## Result of Calibration

Certificate Number : SPR25110089-4

Page : 3 of 3

Temperature Accuracy in the Measurement. (WET)

Unit : °C

| Temperature Setting | Standard Reading | UUC Reading | Error  | Uncertainty ( ± ) |
|---------------------|------------------|-------------|--------|-------------------|
| 30.0                | 30.006           | 29.5        | -0.506 | 0.20              |
| 35.0                | 35.009           | 34.6        | -0.409 | 0.20              |
| 40.0                | 40.008           | 39.5        | -0.508 | 0.21              |

Temperature Accuracy in the Measurement. (DRY)

Unit : °C

| Temperature Setting | Standard Reading | UUC Reading | Error  | Uncertainty ( ± ) |
|---------------------|------------------|-------------|--------|-------------------|
| 30.0                | 30.006           | 29.5        | -0.506 | 0.20              |
| 35.0                | 35.009           | 34.6        | -0.409 | 0.20              |
| 40.0                | 40.008           | 39.6        | -0.408 | 0.21              |

Temperature Accuracy in the Measurement. (GLOVE)

Unit : °C

| Temperature Setting | Standard Reading | UUC Reading | Error  | Uncertainty ( ± ) |
|---------------------|------------------|-------------|--------|-------------------|
| 30.0                | 30.006           | 29.6        | -0.406 | 0.20              |
| 35.0                | 35.009           | 34.7        | -0.309 | 0.20              |
| 40.0                | 40.008           | 39.7        | -0.308 | 0.21              |

### Note :

The result of calibration was found accurate as show on date and place of calibration only.  
This Certificate is not certified for any commercial transaction.

### Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor k = 2, providing a level of confidence approximately 95%.

- End of Certificate -



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Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

Heat B\_308\_3

| Heat Stress WBGT Meter Verification Report                           |                            |                     |                      |
|----------------------------------------------------------------------|----------------------------|---------------------|----------------------|
| Verification Data                                                    |                            |                     |                      |
| Heat Stress WBGT Meter No.                                           | : B31                      | Verification Date   | : 12 June 2026       |
| Brand                                                                | : Quest Technologies       | Ambient Temp.       | : 24.5 °C            |
| Model                                                                | : QUESTemp <sup>o</sup> 32 | Barometric Pressure | : 1011 mmbar         |
| Serial No.                                                           | : TPH050047                | Relative Humidity   | : 49 %               |
| Verification Module (Electronic Sensor Check) :                      |                            |                     |                      |
| Verification Module No. : 21 WB = 12.5 °C, DB = 47.1 °C, G = 69.3 °C |                            |                     |                      |
| Result of Verification : Without Adjustment                          |                            |                     |                      |
| Wet Probe Temperature Measurement                                    |                            |                     |                      |
| Verification Module Reading (°C)                                     | UUC* Reading (°C)          | Correction (°C)     | Tolerance Limit (°C) |
| 12.5                                                                 | 12.6                       | -0.1                | ± 0.5                |
| Dry Probe Temperature Measurement                                    |                            |                     |                      |
| Verification Module Reading (°C)                                     | UUC* Reading (°C)          | Correction (°C)     | Tolerance Limit (°C) |
| 47.1                                                                 | 47.2                       | -0.1                | ± 0.5                |
| Globe Probe Temperature Measurement                                  |                            |                     |                      |
| Verification Module Reading (°C)                                     | UUC* Reading (°C)          | Correction (°C)     | Tolerance Limit (°C) |
| 69.3                                                                 | 69.2                       | 0.1                 | ± 0.5                |
| UUC* = UNIT UNDER CALIBRATION                                        |                            |                     |                      |