

# ภาคผนวก ง

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ข้อมูลการสอบเทียบเครื่องมือ (Calibration Data Sheets)



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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

| Sample Name  | Parameter  | Equipment Name                      | ID No.     | Calibrated Date | Next Cal  | Freq. Calibrate (Months) |
|--------------|--|-------------------------------------|------------|-----------------|-----------|--------------------------|
| Stack (CEMs) | Carbon Monoxide  | Analyzer , System calibration, Star | -          | -               | -         | -                        |
| Stack (CEMs) | Oxides of Nitrogen                                     | Analyzer , System calibration, Star | -          | -               | -         | -                        |
| Stack (CEMs) | Sulfur Dioxide   | Analyzer , System calibration, Star | -          | -               | -         | -                        |
| Stack (CEMs) | Oxygen   | Analyzer , System calibration, Star | -          | -               | -         | -                        |
| Stack        | Total Suspended Particulate                            | Console Control Unit                | BKK_FS0507 | 3-Jan-23        | 3-Jul-23  | 6                        |
| Stack        | Total Suspended Particulate                            | Digital Balance                     | BKK_EN0002 | 8-Feb-23        | 8-Feb-24  | 12                       |
| Ambient      | Particulate Matter (PM-10)                             | High Volume                         | BKK_FS0386 | -               | -         | On site Calibration      |
| Ambient      | Particulate Matter (PM-10)                             | High Volume                         | BKK_FS0385 | -               | -         | On site Calibration      |
| Ambient      | Particulate Matter (PM-10)                             | High Volume                         | BKK_FS0380 | -               | -         | On site Calibration      |
| Ambient      | Particulate Matter (PM-10)                             | High Volume                         | BKK_FS1062 | -               | -         | On site Calibration      |
| Ambient      | Particulate Matter (PM-10)                             | High Volume                         | BKK_FS0383 | -               | -         | On site Calibration      |
| Ambient      | Particulate Matter (PM-10)                             | High Volume                         | BKK_FS0388 | -               | -         | On site Calibration      |
| Ambient      | Particulate Matter (PM-10)                             | Digital Balance                     | BKK_EN0403 | 3-Jun-24        | 3-Jun-25  | 12                       |
| Ambient      | Total Suspended Particulate                            | High Volume                         | BKK_FS0361 | -               | -         | On site Calibration      |
| Ambient      | Total Suspended Particulate                            | High Volume                         | BKK_FS0363 | -               | -         | On site Calibration      |
| Ambient      | Total Suspended Particulate                            | High Volume                         | BKK_FS0362 | -               | -         | On site Calibration      |
| Ambient      | Total Suspended Particulate                            | High Volume                         | BKK_FS0373 | -               | -         | On site Calibration      |
| Ambient      | Total Suspended Particulate                            | High Volume                         | BKK_FS1376 | -               | -         | On site Calibration      |
| Ambient      | Total Suspended Particulate                            | High Volume                         | BKK_FS0367 | -               | -         | On site Calibration      |
| Ambient      | Total Suspended Particulate                            | Digital Balance                     | BKK_EN0403 | 3-Jun-24        | 3-Jun-25  | 12                       |
| Ambient      | Nitrogen Dioxide                                       | NO <sub>2</sub> Analyzer            | BKK_FS0782 | 2-Jul-24        | 2-Jan-25  | 6                        |
| Ambient      | Nitrogen Dioxide                                       | NO <sub>2</sub> Analyzer            | BKK_FS0794 | 2-Jul-24        | 2-Jan-25  | 6                        |
| Ambient      | Nitrogen Dioxide                                       | NO <sub>2</sub> Analyzer            | BKK_FS0773 | 2-Jul-24        | 2-Jan-25  | 6                        |
| Ambient      | Nitrogen Dioxide                                       | NO <sub>2</sub> Analyzer            | BKK_FS0776 | 2-Jul-24        | 2-Jan-25  | 6                        |
| Ambient      | Nitrogen Dioxide                                       | NO <sub>2</sub> Analyzer            | BKK_FS0803 | 3-Jul-24        | 3-Jan-25  | 6                        |
| Ambient      | Nitrogen Dioxide                                       | NO <sub>2</sub> Analyzer            | BKK_FS0741 | 2-Jul-24        | 2-Jan-25  | 6                        |
| Ambient      | Sulfur Dioxide   | SO <sub>2</sub> Analyzer            | BKK_FS0781 | 4-Jul-24        | 4-Jan-25  | 6                        |
| Ambient      | Sulfur Dioxide   | SO <sub>2</sub> Analyzer            | BKK_FS0793 | 4-Jul-24        | 4-Jan-25  | 6                        |
| Ambient      | Sulfur Dioxide   | SO <sub>2</sub> Analyzer            | BKK_FS0772 | 4-Jul-24        | 4-Jan-25  | 6                        |
| Ambient      | Sulfur Dioxide   | SO <sub>2</sub> Analyzer            | BKK_FS0775 | 4-Jul-24        | 4-Jan-25  | 6                        |
| Ambient      | Sulfur Dioxide   | SO <sub>2</sub> Analyzer            | BKK_FS0802 | 5-Jul-24        | 5-Jan-25  | 6                        |
| Ambient      | Sulfur Dioxide   | SO <sub>2</sub> Analyzer            | BKK_FS0740 | 4-Jul-24        | 4-Jan-25  | 6                        |
| Ambient      | Wind Speed / Wind Direction                            | Wind Speed / Wind Direction         | SGK_FS0039 | 19-Dec-23       | 18-Dec-24 | 12                       |
| Ambient      | Wind Speed / Wind Direction                            | Wind Speed / Wind Direction         | RYG_FS0436 | 19-Dec-23       | 18-Dec-24 | 12                       |
| Ambient      | Wind Speed / Wind Direction                            | Wind Speed / Wind Direction         | BKK_FS0157 | 14-Jun-23       | 14-Dec-24 | 18                       |
| Ambient      | Wind Speed / Wind Direction                            | Wind Speed / Wind Direction         | BKK_FS0159 | 21-May-24       | 21-Nov-25 | 18                       |
| Ambient      | Wind Speed / Wind Direction                            | Wind Speed / Wind Direction         | BKK_FS1213 | 21-May-24       | 21-Nov-25 | 18                       |
| Ambient      | Wind Speed / Wind Direction                            | Wind Speed / Wind Direction         | BKK_FS0919 | 26-Aug-24       | 26-Feb-26 | 18                       |
| Workplace    | Sodium hydroxide as NaOH                               | DRYCAL FLOWMETER                    | BKK_FS1346 | 29-Jan-24       | 28-Jan-25 | 12                       |
| Workplace    | Chlorine as NaOCl                                      | DRYCAL FLOWMETER                    | BKK_FS1346 | 29-Jan-24       | 28-Jan-25 | 12                       |
| Workplace    | Iron (III) chloride                                    | DRYCAL FLOWMETER                    | BKK_FS1346 | 29-Jan-24       | 28-Jan-25 | 12                       |
| Workplace    | Iron (III) chloride                                    | ICP-OES                             | BKK_EL0037 | 29-Feb-24       | 28-Feb-25 | 12                       |
| Workplace    | Trisodium phosphate (Na <sub>3</sub> PO <sub>4</sub> ) | DRYCAL FLOWMETER                    | BKK_FS1346 | 29-Jan-24       | 28-Jan-25 | 12                       |
| Workplace    | Trisodium phosphate (Na <sub>3</sub> PO <sub>4</sub> ) | ICP-OES                             | BKK_EL0037 | 29-Feb-24       | 28-Feb-25 | 12                       |
| Workplace    | Sodium bisulfite                                       | DRYCAL FLOWMETER                    | BKK_FS1346 | 29-Jan-24       | 28-Jan-25 | 12                       |
| Workplace    | Sodium bisulfite                                       | ICP-OES                             | BKK_EL0037 | 29-Feb-24       | 28-Feb-25 | 12                       |
| Workplace    | Sulfuric Acid  | DRYCAL FLOWMETER                    | BKK_FS1346 | 29-Jan-24       | 28-Jan-25 | 12                       |
| Workplace    | Sulfuric Acid  | Ion Chromatography                  | BKK_EN0069 | 12-Jan-24       | 12-Jan-25 | 12                       |
| Workplace    | Ammonia  | DRYCAL FLOWMETER                    | BKK_FS1346 | 29-Jan-24       | 28-Jan-25 | 12                       |
| Workplace    | Ammonia  | Spectrophotometer                   | BKK_EN0018 | 13-Sep-24       | 13-Sep-25 | 12                       |
| Noise        | Leq 24 hrs   | Sound Calibrator                    | BKK_FS0630 | 27-Jun-24       | 27-Jun-25 | 12                       |
| Noise        | Leq 24 hrs   | Sound Level Meter                   | BKK_FS0876 | 11-Dec-23       | 10-Dec-24 | 12                       |
| Noise        | Leq 24 hrs   | Sound Level Meter                   | BKK_FS0880 | 11-Dec-23       | 10-Dec-24 | 12                       |
| Noise        | Leq 24 hrs   | Sound Level Meter                   | BKK_FS0930 | 22-Feb-24       | 21-Feb-25 | 12                       |
| Noise        | Leq 24 hrs   | Sound Level Meter                   | BKK_FS0968 | 22-Feb-24       | 21-Feb-25 | 12                       |



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| Sample Name | Parameter       | Equipment Name         | ID No.     | Calibrated Date | Next Cal  | Freq. Calibrate<br>(Months) |
|-------------|-----------------|------------------------|------------|-----------------|-----------|-----------------------------|
| Noise       | Leq 8 hrs       | Sound Calibrator       | BKK_FS0618 | 19-Dec-23       | 18-Dec-24 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0107 | 29-Nov-23       | 28-Nov-24 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0101 | 29-May-24       | 29-May-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0971 | 22-Feb-24       | 21-Feb-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0929 | 21-Feb-24       | 20-Feb-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0926 | 16-Oct-23       | 16-Oct-24 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0115 | 22-Jan-24       | 21-Jan-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0927 | 5-Jan-24        | 4-Jan-25  | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0969 | 23-Feb-24       | 22-Feb-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0106 | 29-Nov-23       | 28-Nov-24 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0924 | 1-Nov-23        | 1-Nov-24  | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0103 | 5-Jan-24        | 4-Jan-25  | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0925 | 7-Nov-23        | 7-Nov-24  | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0995 | 16-Oct-23       | 16-Oct-24 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0994 | 19-Oct-23       | 19-Oct-24 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0113 | 21-Feb-24       | 20-Feb-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Calibrator       | BKK_FS0632 | 26-Jan-24       | 25-Jan-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0930 | 22-Feb-24       | 21-Feb-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0878 | 5-Jan-24        | 4-Jan-25  | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0969 | 23-Feb-24       | 22-Feb-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0097 | 29-Jan-24       | 28-Jan-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0971 | 22-Feb-24       | 21-Feb-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0023 | 3-Jul-24        | 3-Jul-25  | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0024 | 12-Jun-24       | 12-Jun-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0096 | 29-Jan-24       | 28-Jan-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0022 | 12-Jun-24       | 12-Jun-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0025 | 29-May-24       | 29-May-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0021 | 12-Jun-24       | 12-Jun-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0098 | 9-Jul-24        | 9-Jul-25  | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0929 | 21-Feb-24       | 20-Feb-25 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0880 | 11-Dec-23       | 10-Dec-24 | 12                          |
| Noise       | Leq 8 hrs       | Sound Level Meter      | BKK_FS0968 | 22-Feb-24       | 21-Feb-25 | 12                          |
| Noise       | Noise Contour   | Sound Calibrator       | BKK_FS0618 | 19-Dec-23       | 18-Dec-24 | 12                          |
| Noise       | Noise Contour   | Sound Level Meter      | PHK_FS0032 | 3-Jul-24        | 3-Jul-25  | 12                          |
| Noise       | Noise Contour   | Sound Level Meter      | BKK_FS0997 | 10-Jan-24       | 9-Jan-25  | 12                          |
| Noise       | Noise Contour   | Sound Level Meter      | BKK_FS0998 | 1-Nov-23        | 1-Nov-24  | 12                          |
| Noise       | Noise Contour   | Sound Level Meter      | BKK_FS0999 | 16-Oct-23       | 16-Oct-24 | 12                          |
| Noise       | Noise Dose, TWA | Dose Badge Reader      | BKK_FS1002 | 21-Mar-24       | 20-Mar-25 | 12                          |
| Noise       | Noise Dose, TWA | Dose Badge Reader      | BKK_FS0620 | 7-May-24        | 7-May-25  | 12                          |
| Heat        | Heat Stress     | Heat Stress Monitor    | BKK_FS0652 | 8-Dec-23        | 7-Dec-24  | 12                          |
| Heat        | Heat Stress     | Heat Stress Monitor    | BKK_FS0653 | 20-Dec-23       | 19-Dec-24 | 12                          |
| Heat        | Heat Stress     | Heat Stress Monitor    | BKK_FS0663 | 26-Apr-24       | 25-Apr-25 | 12                          |
| Heat        | Heat Stress     | Heat Stress Monitor    | BKK_FS0642 | 13-Feb-24       | 12-Feb-25 | 12                          |
| Heat        | Heat Stress     | Heat Stress Monitor    | BKK_FS0677 | 21-Jun-24       | 21-Jun-25 | 12                          |
| Heat        | Heat Stress     | Heat Stress Monitor    | BKK_FS0659 | 22-Jul-24       | 22-Jul-25 | 12                          |
| Illuminance | Illuminance     | Lux Meter              | BKK_FS1145 | 16-Sep-24       | 16-Sep-25 | 12                          |
| Water Lab   | Arsenic         | ICP-MS                 | BKK_EL0026 | 12-Dec-23       | 13-Jun-25 | 18                          |
| Water Lab   | Arsenic         | Hot Block              | BKK_EL0054 | 22-Sep-23       | 22-Mar-25 | 18                          |
| Water Lab   | Arsenic         | Chamber (Cooling Room) | BKK_EN0167 | 6-Dec-23        | 6-Jun-25  | 18                          |
| Water Lab   | Barium          | ICP-MS                 | BKK_EL0026 | 12-Dec-23       | 13-Jun-25 | 18                          |
| Water Lab   | Barium          | Hot Block              | BKK_EL0054 | 22-Sep-23       | 22-Mar-25 | 18                          |
| Water Lab   | Barium          | Chamber (Cooling Room) | BKK_EN0167 | 6-Dec-23        | 6-Jun-25  | 18                          |
| Water Lab   | Chromium        | ICP-MS                 | BKK_EL0026 | 12-Dec-23       | 13-Jun-25 | 18                          |
| Water Lab   | Chromium        | Hot Block              | BKK_EL0054 | 22-Sep-23       | 22-Mar-25 | 18                          |
| Water Lab   | Chromium        | Chamber (Cooling Room) | BKK_EN0167 | 6-Dec-23        | 6-Jun-25  | 18                          |





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| Sample Name | Parameter                    | Equipment Name                 | ID No.     | Calibrated Date | Next Cal  | Freq. Calibrate<br>(Months) |
|-------------|------------------------------|--------------------------------|------------|-----------------|-----------|-----------------------------|
| Water Lab   | Cadmium                      | ICP-MS                         | BKK_EL0026 | 12-Dec-23       | 13-Jun-25 | 18                          |
| Water Lab   | Cadmium                      | Hot Block                      | BKK_EL0054 | 22-Sep-23       | 22-Mar-25 | 18                          |
| Water Lab   | Cadmium                      | Chamber (Cooling Room)         | BKK_EN0167 | 6-Dec-23        | 6-Jun-25  | 18                          |
| Water Lab   | Copper                       | ICP-MS                         | BKK_EL0026 | 12-Dec-23       | 13-Jun-25 | 18                          |
| Water Lab   | Copper                       | Hot Block                      | BKK_EL0054 | 22-Sep-23       | 22-Mar-25 | 18                          |
| Water Lab   | Copper                       | Chamber (Cooling Room)         | BKK_EN0167 | 6-Dec-23        | 6-Jun-25  | 18                          |
| Water Lab   | Lead                         | ICP-MS                         | BKK_EL0026 | 12-Dec-23       | 13-Jun-25 | 18                          |
| Water Lab   | Lead                         | Hot Block                      | BKK_EL0054 | 22-Sep-23       | 22-Mar-25 | 18                          |
| Water Lab   | Lead                         | Chamber (Cooling Room)         | BKK_EN0167 | 6-Dec-23        | 6-Jun-25  | 18                          |
| Water Lab   | Iron                         | ICP-MS                         | BKK_EL0026 | 12-Dec-23       | 13-Jun-25 | 18                          |
| Water Lab   | Iron                         | Hot Block                      | BKK_EL0054 | 22-Sep-23       | 22-Mar-25 | 18                          |
| Water Lab   | Iron                         | Chamber (Cooling Room)         | BKK_EN0167 | 6-Dec-23        | 6-Jun-25  | 18                          |
| Water Lab   | Nickel                       | ICP-MS                         | BKK_EL0026 | 12-Dec-23       | 13-Jun-25 | 18                          |
| Water Lab   | Nickel                       | Hot Block                      | BKK_EL0054 | 22-Sep-23       | 22-Mar-25 | 18                          |
| Water Lab   | Nickel                       | Chamber (Cooling Room)         | BKK_EN0167 | 6-Dec-23        | 6-Jun-25  | 18                          |
| Water Lab   | Manganese                    | ICP-MS                         | BKK_EL0026 | 12-Dec-23       | 13-Jun-25 | 18                          |
| Water Lab   | Manganese                    | Hot Block                      | BKK_EL0054 | 22-Sep-23       | 22-Mar-25 | 18                          |
| Water Lab   | Manganese                    | Chamber (Cooling Room)         | BKK_EN0167 | 6-Dec-23        | 6-Jun-25  | 18                          |
| Water Lab   | Selenium                     | ICP-MS                         | BKK_EL0026 | 12-Dec-23       | 13-Jun-25 | 18                          |
| Water Lab   | Selenium                     | Hot Block                      | BKK_EL0054 | 22-Sep-23       | 22-Mar-25 | 18                          |
| Water Lab   | Selenium                     | Chamber (Cooling Room)         | BKK_EN0167 | 6-Dec-23        | 6-Jun-25  | 18                          |
| Water Lab   | Zinc                         | ICP-MS                         | BKK_EL0026 | 12-Dec-23       | 13-Jun-25 | 18                          |
| Water Lab   | Zinc                         | Hot Block                      | BKK_EL0054 | 22-Sep-23       | 22-Mar-25 | 18                          |
| Water Lab   | Zinc                         | Chamber (Cooling Room)         | BKK_EN0167 | 6-Dec-23        | 6-Jun-25  | 18                          |
| Water Lab   | Mercury                      | DUO-CVAFS / CVAAS              | BKK_EL0023 | 24-May-23       | 23-Nov-24 | 18                          |
| Water Lab   | Temperature                  | pH Meter with Sensor           | BKK_LG0031 | 26-Feb-24       | 26-Feb-25 | 12                          |
| Water Lab   | BOD                          | DO Meter                       | BKK_EN0017 | 16-Nov-23       | 16-May-25 | 18                          |
| Water Lab   | BOD                          | Incubator                      | BKK_EN0304 | 20-Mar-24       | 20-Mar-25 | 12                          |
| Water Lab   | BOD                          | Burette                        | BKK_EN0171 | 27-Feb-24       | 27-Aug-25 | 18                          |
| Water Lab   | COD                          | Hot Block                      | BKK_EN0222 | 22-Apr-24       | 22-Apr-25 | 12                          |
| Water Lab   | COD                          | Spectrophotometer              | BKK_EN0018 | 13-Sep-24       | 13-Sep-25 | 12                          |
| Water Lab   | Total Suspended Solids       | Electronic Top-Loading Balance | BKK_EN0003 | 2-Aug-24        | 2-Aug-25  | 12                          |
| Water Lab   | Total Suspended Solids       | Oven                           | BKK_EN0273 | 14-May-24       | 14-Nov-25 | 18                          |
| Water Lab   | Total Dissolved Solids 180°C | Electronic Top-Loading Balance | BKK_EN0003 | 2-Aug-24        | 2-Aug-25  | 12                          |
| Water Lab   | Total Dissolved Solids 180°C | Oven                           | BKK_EN0273 | 14-May-24       | 14-Nov-25 | 18                          |
| Water Lab   | Oil & Grease                 | Electronic Top-Loading Balance | BKK_EN0003 | 2-Aug-24        | 2-Aug-25  | 12                          |
| Water Lab   | Oil & Grease                 | Water Bath                     | BKK_EN0148 | 4-Jul-23        | 4-Jan-25  | 18                          |
| Water Lab   | pH at 25 °C                  | pH meter                       | BKK_EN0342 | 27-Oct-23       | 27-Oct-24 | 12                          |
| Water Lab   | Residual Free Chlorine       | Chlorine Meter                 | BKK_LG0069 | 12-Mar-24       | 12-Mar-25 | 12                          |
| Water Lab   | Organochlorine Pesticide     | GC MSMS                        | BKK_EN0284 | 25-May-23       | 25-Nov-24 | 18                          |
| Water Lab   | Volatile Organic Compound    | Gas Chromatography (MSD)       | BKK_EN0059 | 13-Dec-23       | 13-Jun-25 | 18                          |
| Water Lab   | Cyanide                      | Spectrophotometer              | BKK_EN0018 | 13-Sep-24       | 13-Sep-25 | 12                          |
| Water Lab   | Cyanide                      | Chamber (Cooling Room)         | BKK_EN0167 | 6-Dec-23        | 6-Jun-25  | 18                          |
| Water Lab   | PCBs                         | GC MSMS                        | BKK_EN0284 | 25-May-23       | 25-Nov-24 | 18                          |
| Water Lab   | Benzo(a)pyrene               | Gas Chromatography (MSD)       | BKK_EN0049 | 25-Apr-23       | 25-Oct-24 | 18                          |
| Water Lab   | Vinyl chloride               | Gas Chromatography (MSD)       | BKK_EN0059 | 13-Dec-23       | 13-Jun-25 | 18                          |
| Water Lab   | Ammonia Nitrogen             | Discrete analyzer              | BKK_EN0037 | 16-Aug-24       | 16-Aug-25 | 12                          |
| Water Lab   | Total Hardness               | Burette                        | BKK_EN0171 | 27-Feb-24       | 27-Aug-25 | 18                          |
| Water Lab   | Color                        | Chamber (Cooling Room)         | BKK_EN0167 | 6-Dec-23        | 6-Jun-25  | 18                          |
| Water Lab   | Turbidity                    | Chamber (Cooling Room)         | BKK_EN0167 | 6-Dec-23        | 6-Jun-25  | 18                          |
| Water Lab   | Sulfide                      | Burette                        | BKK_EN0171 | 27-Feb-24       | 27-Aug-25 | 18                          |
| Water Lab   | Sulfide                      | Chamber (Cooling Room)         | BKK_EN0167 | 6-Dec-23        | 6-Jun-25  | 18                          |
| Water Lab   | Nitrate nitrogen             | Ion Chromatography             | BKK_EN0069 | 12-Jan-24       | 12-Jan-25 | 12                          |
| Water Lab   | Chloride                     | Ion Chromatography             | BKK_EN0069 | 12-Jan-24       | 12-Jan-25 | 12                          |
| Water Lab   | Sulfate                      | Ion Chromatography             | BKK_EN0069 | 12-Jan-24       | 12-Jan-25 | 12                          |
| Water Lab   | Conductivity                 | Conductivity meter             | BKK_EN0373 | 25-Dec-23       | 25-Dec-24 | 12                          |
| Water Lab   | Pyrethroid Group Pesticides  | GC MSMS                        | BKK_EN0284 | 25-May-23       | 25-Nov-24 | 18                          |



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### CERTIFICATE OF CALIBRATION



### CERTIFICATE OF CALIBRATION

[illegible]

|               |                             |                 |                  |   |
|---------------|-----------------------------|-----------------|------------------|---|
| Personen:     | Personen: <u>Indonesien</u> | UICN-Kategorie: | <u>LC</u> (L200) | 1 |
| Bestandssatz: | <u>Indonesien</u>           | Produktions:    | <u>LC</u> (L200) | 1 |
| Maße:         | <u>Indonesien</u>           | UICN-Kategorie: | <u>LC</u> (L200) | 1 |
| Maße:         | <u>Indonesien</u>           | Produktions:    | <u>LC</u> (L200) | 1 |
| Produktion:   | <u>Indonesien</u>           | UICN-Kategorie: | <u>LC</u> (L200) | 1 |



Approved by \_\_\_\_\_  
(Mr. Noppang Naitrangso)  
Senior Field Coordinator Scientist (T)

WILEY-BLANKENHORN, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 267



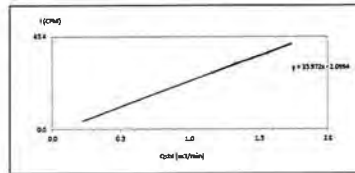
## CERTIFICATE OF CALIBRATION



Project Site: Kueng Khai Power Generation Company Limited Barometric Pressure (mm Hg): 764.3

|               |  |                              |       |
|---------------|--|------------------------------|-------|
| Project Size: | Kang Khod Power Generation<br>Capacity: 120 MW | Barometric Pressure (mm Hg): | 754.3 |
|---------------|--|------------------------------|-------|

| Test No. | Br in H <sub>2</sub> O (ppm) | Gas (ppm/psia) | Br: Gas <sup>a</sup> (ppm) | Linear Regression              |
|----------|------------------------------|----------------|----------------------------|--------------------------------|
| 1        | 3.7                          | 1.6706         | 46                         | Gupe 35.9717                   |
| 2        | 4.8                          | 1.3163         | 46                         | Intercept 1.0994               |
| 3        | 5.7                          | 1.4445         | 50                         | Correlation Coefficient 0.9996 |
| 4        | 6.7                          | 1.5462         | 54                         |                                |
| 5        | 8.1                          | 1.7217         | 66                         |                                |



Approved by : \_\_\_\_\_  
(Mr Noppong Juntaruporn)

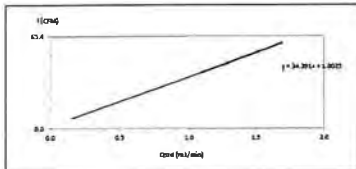
FORM NO. E 66-273 REVISION NO. 2 DATE DATE 26/11/23



## High Volume Air Sampler Calibration Worksheet

|                          |   |                              |            |
|--------------------------|---|------------------------------|------------|
| Project Site:            | Beijing East Power Generation Company Limited | Barometric Pressure (mm Hg): | 754.3      |
| Calibrator Location:     | ShiYi   | Temperature (°C):            | 13.2       |
| Calibration Date:        | 10-Oct-24                                     | High Volume ID:              | BE3_P50373 |
| Calibration Received On: | C-101924-BKX_P50373                           | High Volume Model:           | G105       |
| Calibrator ID:           | BE3_P5024                                     | High Volume S/N:             | 1210       |
| Calibrator Model:        | TE 5028A                                      | Calibrator Slope:            | 1.644%     |
| Calibrator S/N:          | 7154  | Calibrator Intercept:        | 0.927%     |

| Test No. | Bulk H <sub>2</sub> O (mg) | Gas (mg / mg) | I-Chart (GPa) | Linear Regression                |
|----------|----------------------------|---------------|---------------|----------------------------------|
| 1        | 3.3                        | 1.1881        | 40            | Slope = 24.9722                  |
| 2        | 4.0                        | 1.2899        | 46            | Intercept = 1.8023               |
| 3        | 5.3                        | 1.3974        | 50            | Correlation Coefficient = 0.9998 |
| 4        | 6.3                        | 1.5213        | 54            |                                  |
| 5        | 7.8                        | 1.6496        | 60            |                                  |



Approved by \_\_\_\_\_  
(Mr. Nopping, Notary)  
Enrico Field (Coordinator Sciences) [3]

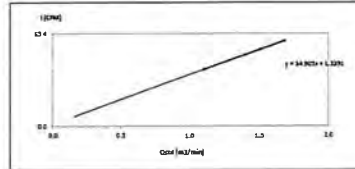
FORM NO. 8 (REV. 07) REVISION NO. 2 ISSUE DATE: 28/11/2014



## High Volume Air Sampler Calibration Worksheet

|                        |   |                               |            |
|------------------------|---|-------------------------------|------------|
| Project Size:          | Kay Khyi Power Generation Company Limited | Barroetown Pervavato (sum Hg) | 754.3      |
| Calibration location:  | Thapunya                                  | Temperature (°C)              | 33.2       |
| Calibration Date:      | 10 Oct 24                                 | High Volume ID#:              | B04_P01736 |
| Calibration Rec'd No.: | C-101624-B04_P01736                       | High Volume Model#:           | TE 5470    |
| Calibrator ID:         | RSS_P00343                                | High Volume S/N#:             | 5470       |
| Calibrator Model:      | TY 62064                                  | Calibrator Range:             | 1.6491     |
| Calibrator S/N#:       | 21864                                     | Calibrator Intercept:         | 0.8231%    |

| Test No. | Dro H <sub>2</sub> O<br>(mm) | Q <sub>at</sub><br>(m <sup>3</sup> /sec) | Chart<br>(cm) | Linear Regression   |
|----------|------------------------------|--|---------------|---|
| 1        | 3.3                          | 1.1003                                   | 40            | Slope = 34.9049<br>Intercept = 1.3191<br>Correlation Coefficient = 0.9999 |
| 2        | 4.4                          | 1.2737                                   | 46            |   |
| 3        | 5.2                          | 1.2976                                   | 50            |   |
| 4        | 6.2                          | 1.5061                                   | 54            |   |
| 5        | 7.7                          | 1.6793                                   | 60            |   |



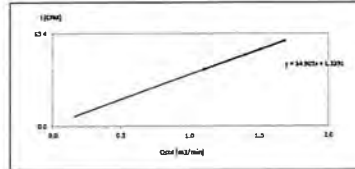
Approved by \_\_\_\_\_  
(for Shipping Supervisor)  
Enviro Field Coordinator Schedule (T)

FORM NO. P-66-075 REVISION NO. 3 ISSUE DATE: 06/11/2013



## High Volume Air Sampler Calibration Worksheet

| Test No. | Dro H <sub>2</sub> O<br>(mm) | Q <sub>at</sub><br>(m <sup>3</sup> /sec) | Chart<br>(cm) | Linear Regression   |
|----------|------------------------------|--|---------------|---|
| 1        | 3.3                          | 1.1003                                   | 40            | Slope = 34.9049<br>Intercept = 1.3191<br>Correlation Coefficient = 0.9999 |
| 2        | 4.4                          | 1.2737                                   | 46            |   |
| 3        | 5.2                          | 1.2976                                   | 50            |   |
| 4        | 6.2                          | 1.5061                                   | 54            |   |
| 5        | 7.7                          | 1.6793                                   | 60            |   |



Approved by \_\_\_\_\_  
(Mr. Hopping Jamarapan)  
Rural Field Coordinator Science (3)

FORM NO. F 54-073 REVISION NO. 2 ISSUE DATE 24/31/21



**ALS**

**High Volume Air Sampler Calibration Worksheet**

Project ID:                           Sampling Location:                           Barometric Pressure (mm Hg): 754.9

Calibration Date: 15-Dec-21      Temperature (°C): 33.3

Calibration Method No.: C-181894-REV-7/2016.7      High Volume ID: BKX F30717

Calibrator ID: BKX F30624      High Volume Size: 4.0

Calibrator Model: TE-30724      Calibrator Setup: 1.44951

Calibrator A/R: 2994      Calibrator Interval: 0.0279

| Test No. | Picks H <sub>2</sub> O (mL) | Gas (m³/min) | Flow (CFM) | Linear Regression              |
|----------|-----------------------------|--------------|------------|--------------------------------|
| 1        | 3.3                         | 1.1875       | 48         | Chips 31.0545                  |
| 2        | 6.4                         | 1.2757       | 48         | Intercept 2.4234               |
| 3        | 3.2                         | 1.3975       | 30         | Correlation Coefficient 0.9996 |
| 4        | 6.3                         | 1.3215       | 34         |                                |
| 5        | 6.8                         | 1.3722       | 48         |                                |

Calibrated by: [Signature]      Approved by: [Signature]

(Mr. Jerrard Sakum)      (Mr. Jerrard Sakum)  
Field Environmental Scientist (2)      Assistant General Manager

FORM NO. F-08-015      REVISION NO. 2      ISSUE DATE: 01/11/21

**ALS**

**MULTIPOINT CALIBRATION REPORT**

Calibration Date: 2-Jul-21      Equipment Name: NOx Analyzer

Manufacturer: HORIBA      Model: APNA-370

Serial No.: WP534WV      Equipment ID: BKX F30773

Calibrator Manufacturer: Tekflow API      Model: 700

Serial No.: 547      Cylender No.: GH0527222

Std. Gas Concentration (PPM): 88.88      Certified By: Argon Inc.

Cylender Pressure (psi): 1800      Expired Date: 9-Feb-30

Certified Date: 9-Feb-22

| Point       | Ideal  | Actual NO | Error NO | %Error NO | Actual NOx | Error NOx | %Error NOx |
|-------------|--------|-----------|----------|-----------|------------|-----------|------------|
| ZERO        | 0.00   | 0.10      | 0.10     | 0.10      | 0.10       | 0.10      | 0.10       |
| 1           | 100.00 | 99.60     | -0.40    | -0.40     | 100.60     | 0.60      | 0.60       |
| 2           | 200.00 | 198.70    | -1.30    | -0.65     | 201.30     | 1.30      | 0.65       |
| 3           | 300.00 | 298.40    | -1.60    | -0.53     | 298.40     | -1.60     | -0.53      |
| 4           | 400.00 | 398.70    | -1.30    | -0.33     | 399.10     | -0.90     | -0.22      |
| AVERAGE (%) |        |           |          | -0.26     |            |           | 0.11       |

Calibrated By: [Signature]      Approved By: [Signature]

(Mr. Jerrard Sakum)      (Mr. Jerrard Sakum)  
Field Environmental Scientist (2)      Assistant General Manager

FORM NO. F-08-006      REVISION NO. 1      ISSUE DATE: 05/04/21

**ALS**

**MULTIPOINT CALIBRATION REPORT**

Calibration Date: 2-Jul-21      Equipment Name: NOx Analyzer

Manufacturer: HORIBA      Model: APNA-370

Serial No.: REAS03MC      Equipment ID: BKX F30774

Calibrator Manufacturer: Tekflow API      Model: 700

Serial No.: 547      Cylender No.: GH0527222

Std. Gas Concentration (PPM): 88.88      Certified By: Argon Inc.

Cylender Pressure (psi): 1800      Expired Date: 9-Feb-30

Certified Date: 9-Feb-22

| Point       | Ideal  | Actual NO | Error NO | %Error NO | Actual NOx | Error NOx | %Error NOx |
|-------------|--------|-----------|----------|-----------|------------|-----------|------------|
| ZERO        | 0.00   | 0.10      | 0.10     | 0.10      | 0.10       | 0.10      | 0.10       |
| 1           | 100.00 | 99.40     | -0.60    | -0.60     | 100.20     | 0.20      | 0.20       |
| 2           | 200.00 | 198.60    | -1.40    | -0.70     | 198.60     | -1.40     | -0.70      |
| 3           | 300.00 | 297.50    | -1.50    | -0.50     | 296.50     | -1.50     | -0.50      |
| 4           | 400.00 | 395.70    | -4.30    | -1.08     | 395.60     | -4.40     | -1.10      |
| AVERAGE (%) |        |           |          | -0.68     |            |           | -0.18      |

Calibrated By: [Signature]      Approved By: [Signature]

(Mr. Jerrard Sakum)      (Mr. Jerrard Sakum)  
Field Environmental Scientist (2)      Assistant General Manager

FORM NO. F-08-006      REVISION NO. 1      ISSUE DATE: 05/04/21

**ALS**

**MULTIPOINT CALIBRATION REPORT**

Calibration Date: 2-Jul-21      Equipment Name: NOx Analyzer

Manufacturer: Tekflow API      Model: 200E

Serial No.: 4379      Equipment ID: BKX F30773

Calibrator Manufacturer: Tekflow API      Model: 700

Serial No.: 547      Cylender No.: GH0527222

Std. Gas Concentration (PPM): 88.88      Certified By: Argon Inc.

Cylender Pressure (psi): 1800      Expired Date: 9-Feb-30

Certified Date: 9-Feb-22

| Point       | Ideal  | Actual NO | Error NO | %Error NO | Actual NOx | Error NOx | %Error NOx |
|-------------|--------|-----------|----------|-----------|------------|-----------|------------|
| ZERO        | 0.00   | 0.10      | 0.10     | 0.10      | 0.10       | 0.10      | 0.10       |
| 1           | 100.00 | 99.10     | -0.90    | -0.90     | 101.10     | 1.10      | 1.10       |
| 2           | 200.00 | 199.60    | -0.40    | -0.20     | 202.70     | 2.70      | 1.35       |
| 3           | 300.00 | 298.20    | -1.80    | -0.60     | 301.20     | 1.20      | 0.40       |
| 4           | 400.00 | 398.60    | -1.40    | -0.35     | 402.60     | 2.60      | 0.65       |
| AVERAGE (%) |        |           |          | -0.29     |            |           | 0.71       |

Calibrated By: [Signature]      Approved By: [Signature]

(Mr. Jerrard Sakum)      (Mr. Jerrard Sakum)  
Field Environmental Scientist (2)      Assistant General Manager

FORM NO. F-08-006      REVISION NO. 1      ISSUE DATE: 05/04/21

**ALS**

**MULTIPOINT CALIBRATION REPORT**

Calibration Date: 2-Jul-21      Equipment Name: NOx Analyzer

Manufacturer: Tekflow API      Model: 200E

Serial No.: 4379      Equipment ID: BKX F30778

Calibrator Manufacturer: Tekflow API      Model: 700

Serial No.: 547      Cylender No.: GH0527222

Std. Gas Concentration (PPM): 88.88      Certified By: Argon Inc.

Cylender Pressure (psi): 1800      Expired Date: 9-Feb-30

Certified Date: 9-Feb-22

| Point       | Ideal  | Actual NO | Error NO | %Error NO | Actual NOx | Error NOx | %Error NOx |
|-------------|--------|-----------|----------|-----------|------------|-----------|------------|
| ZERO        | 0.00   | 0.10      | 0.10     | 0.10      | 0.10       | 0.10      | 0.10       |
| 1           | 100.00 | 99.30     | -0.70    | -0.70     | 101.10     | 1.10      | 1.10       |
| 2           | 200.00 | 199.30    | -0.70    | -0.35     | 199.60     | -0.40     | -0.20      |
| 3           | 300.00 | 297.30    | -2.70    | -0.90     | 301.30     | 1.30      | 0.43       |
| 4           | 400.00 | 401.60    | 1.60     | 0.40      | 402.10     | 2.10      | 0.53       |
| AVERAGE (%) |        |           |          | -0.31     |            |           | 0.38       |

Calibrated By: [Signature]      Approved By: [Signature]

(Mr. Jerrard Sakum)      (Mr. Jerrard Sakum)  
Field Environmental Scientist (2)      Assistant General Manager

FORM NO. F-08-006      REVISION NO. 1      ISSUE DATE: 05/04/21

**ALS**

**MULTIPOINT CALIBRATION REPORT**

Calibration Date: 2-Jul-21      Equipment Name: NOx Analyzer

Manufacturer: HORIBA      Model: APNA-370

Serial No.: XHRA300      Equipment ID: BKX F30803

Calibrator Manufacturer: Tekflow API      Model: 700

Serial No.: 547      Cylender No.: GH0527222

Std. Gas Concentration (PPM): 88.88      Certified By: Argon Inc.

Cylender Pressure (psi): 1800      Expired Date: 9-Feb-30

Certified Date: 9-Feb-22

| Point       | Ideal  | Actual NO | Error NO | %Error NO | Actual NOx | Error NOx | %Error NOx |
|-------------|--------|-----------|----------|-----------|------------|-----------|------------|
| ZERO        | 0.00   | 0.10      | 0.10     | 0.10      | 0.10       | 0.10      | 0.10       |
| 1           | 100.00 | 98.30     | -1.70    | -1.70     | 100.50     | 0.50      | 0.50       |
| 2           | 200.00 | 201.60    | 1.60     | 0.75      | 201.20     | 1.20      | 0.60       |
| 3           | 300.00 | 299.40    | -0.60    | -0.20     | 302.10     | 2.10      | 0.70       |
| 4           | 400.00 | 396.50    | -3.50    | -0.88     | 396.60     | -3.40     | -0.85      |
| AVERAGE (%) |        |           |          | -0.38     |            |           | 0.31       |

Calibrated By: [Signature]      Approved By: [Signature]

(Mr. Jerrard Sakum)      (Mr. Jerrard Sakum)  
Field Environmental Scientist (2)      Assistant General Manager

FORM NO. F-08-006      REVISION NO. 1      ISSUE DATE: 05/04/21

**ALS**

**MULTIPOINT CALIBRATION REPORT**

Calibration Date: 2-Jul-21      Equipment Name: NOx Analyzer

Manufacturer: Tekflow API      Model: T200

Serial No.: 060      Equipment ID: BKX F30741

Calibrator Manufacturer: Tekflow API      Model: 700

Serial No.: 547      Cylender No.: GH0527222

Std. Gas Concentration (PPM): 88.88      Certified By: Argon Inc.

Cylender Pressure (psi): 1800      Expired Date: 9-Feb-30

Certified Date: 9-Feb-22

| Point       | Ideal  | Actual NO | Error NO | %Error NO | Actual NOx | Error NOx | %Error NOx |
|-------------|--------|-----------|----------|-----------|------------|-----------|------------|
| ZERO        | 0.00   | 0.10      | 0.10     | 0.10      | 0.10       | 0.10      | 0.10       |
| 1           | 100.00 | 99.80     | -0.20    | -0.20     | 101.10     | 1.10      | 1.10       |
| 2           | 200.00 | 199.30    | -0.70    | -0.35     | 199.30     | -0.70     | -0.35      |
| 3           | 300.00 | 297.60    | -2.40    | -0.80     | 301.70     | 1.70      | 0.57       |
| 4           | 400.00 | 398.70    | -1.30    | -0.33     | 398.20     | -0.80     | -0.20      |
| AVERAGE (%) |        |           |          | -0.41     |            |           | 0.19       |

Calibrated By: [Signature]      Approved By: [Signature]

(Mr. Jerrard Sakum)      (Mr. Jerrard Sakum)  
Field Environmental Scientist (2)      Assistant General Manager

FORM NO. F-08-006      REVISION NO. 1      ISSUE DATE: 05/04/21

**ALS**

**MULTIPOINT CALIBRATION REPORT**

Calibration Date: 2-Jul-21      Equipment Name: SO2 Analyzer

Manufacturer: HORIBA      Model: APSA-370

Serial No.: YES03078      Equipment ID: BKX F30781

Calibrator Manufacturer: Tekflow API      Model: 700

Serial No.: 547      Cylender No.: GH0527222

Std. Gas Concentration (PPM): 88.3      Certified By: Argon Inc.

Cylender Pressure (psi): 1800      Expired Date: 9-Feb-30

Certified Date: 9-Feb-22

| Point       | Ideal  | Actual | Error | %Error |
|-------------|--------|--------|-------|--------|
| ZERO        | 0.00   | 0.10   | 0.10  | 0.10   |
| 1           | 100.00 | 99.80  | -0.20 | -0.20  |
| 2           | 200.00 | 199.20 | -0.80 | -0.40  |
| 3           | 300.00 | 298.80 | -1.20 | -0.40  |
| 4           | 400.00 | 398.70 | -1.30 | -0.33  |
| AVERAGE (%) |        |        |       | -0.27  |

Calibrated By: [Signature]      Approved By: [Signature]

(Mr. Jerrard Sakum)      (Mr. Jerrard Sakum)  
Field Environmental Scientist (2)      Assistant General Manager

FORM NO. F-08-006      REVISION NO. 1      ISSUE DATE: 05/04/21

**ALS**

**MULTIPOINT CALIBRATION REPORT**

Calibration Date: 2-Jul-21      Equipment Name: SO2 Analyzer

Manufacturer: HORIBA      Model: APSA-370

Serial No.: ZS0405P      Equipment ID: BKX F30790

Calibrator Manufacturer: Tekflow API      Model: 700

Serial No.: 547      Cylender No.: GH0527222

Std. Gas Concentration (PPM): 88.3      Certified By: Argon Inc.

Cylender Pressure (psi): 1800      Expired Date: 9-Feb-30

Certified Date: 9-Feb-22

| Point       | Ideal  | Actual | Error | %Error |
|-------------|--------|--------|-------|--------|
| ZERO        | 0.00   | 0.10   | 0.10  | 0.10   |
| 1           | 100.00 | 99.10  | -0.90 | -0.90  |
| 2           | 200.00 | 199.60 | -0.40 | -0.20  |
| 3           | 300.00 | 298.60 | -1.40 | -0.47  |
| 4           | 400.00 | 398.60 | -1.40 | -0.35  |
| AVERAGE (%) |        |        |       | -0.48  |

Calibrated By: [Signature]      Approved By: [Signature]

(Mr. Jerrard Sakum)      (Mr. Jerrard Sakum)  
Field Environmental Scientist (2)      Assistant General Manager

FORM NO. F-08-006      REVISION NO. 1      ISSUE DATE: 05/04/21

**ALS** **MULTIPOINT CALIBRATION REPORT**

Calibration Date: 4-Jul-24 Equipment Name: SO2 Analyzer  
 Manufacturer: Teledyne API Model: 100E  
 Serial No.: 3469 Equipment ID: BKS\_F50772  
 Calibrator Manufacturer: Teledyne API Model: 720  
 Serial No.: 847  
 Sol. Gas Concentration (PPM): 88.3 Cylinder No.: GMS07222  
 Officer Pressure (psi): 1800 Certified By: Angus Inc.  
 Certified Date: 8-Feb-22 Expired Date: 8-Feb-30

| Point       | Ideal  | Actual | Error | %Error |
|-------------|--------|--------|-------|--------|
| ZERO        | 0.00   | 0.10   | 0.10  | 0.10   |
| 1           | 100.00 | 99.43  | -0.56 | -0.56  |
| 2           | 200.00 | 197.70 | -2.30 | -1.15  |
| 3           | 300.00 | 298.42 | -1.58 | -0.53  |
| 4           | 400.00 | 399.70 | -0.30 | -0.08  |
| AVERAGE (%) |        |        |       |        |

Calibrated By: (Mr. Arjun Sahani) Field Environmental Scientist (F)  
 Approved By: (Mr. Sarfath Jeyaram) Assistant General Manager

FORM NO. F-0002 REVISION NO.: ISSUE DATE: 09/04/22

**ALS** **MULTIPOINT CALIBRATION REPORT**

Calibration Date: 4-Jul-24 Equipment Name: SO2 Analyzer  
 Manufacturer: Teledyne API Model: 100E  
 Serial No.: 3469 Equipment ID: BKS\_F50772  
 Calibrator Manufacturer: Teledyne API Model: 720  
 Serial No.: 847  
 Sol. Gas Concentration (PPM): 88.3 Cylinder No.: GMS07222  
 Officer Pressure (psi): 1800 Certified By: Angus Inc.  
 Certified Date: 8-Feb-22 Expired Date: 8-Feb-30

| Point       | Ideal  | Actual | Error | %Error |
|-------------|--------|--------|-------|--------|
| ZERO        | 0.00   | 0.10   | 0.10  | 0.10   |
| 1           | 100.00 | 99.00  | -1.00 | -1.00  |
| 2           | 200.00 | 198.00 | -2.00 | -1.00  |
| 3           | 300.00 | 298.00 | -2.00 | -0.67  |
| 4           | 400.00 | 401.30 | 1.30  | 0.33   |
| AVERAGE (%) |        |        |       |        |

Calibrated By: (Mr. Arjun Sahani) Field Environmental Scientist (F)  
 Approved By: (Mr. Sarfath Jeyaram) Assistant General Manager

FORM NO. F-0002 REVISION NO.: ISSUE DATE: 09/04/22

**ALS** **MULTIPOINT CALIBRATION REPORT**

Calibration Date: 5-Jul-24 Equipment Name: SO2 Analyzer  
 Manufacturer: HONDA Model: JPSA370  
 Serial No.: 283AB00 Equipment ID: BKS\_F50002  
 Calibrator Manufacturer: Teledyne API Model: 720  
 Serial No.: 847  
 Sol. Gas Concentration (PPM): 88.3 Cylinder No.: GMS07222  
 Officer Pressure (psi): 1800 Certified By: Angus Inc.  
 Certified Date: 8-Feb-22 Expired Date: 8-Feb-30

| Point       | Ideal  | Actual | Error | %Error |
|-------------|--------|--------|-------|--------|
| ZERO        | 0.00   | 0.10   | 0.10  | 0.10   |
| 1           | 100.00 | 101.00 | 1.00  | 1.00   |
| 2           | 200.00 | 199.40 | -0.60 | -0.30  |
| 3           | 300.00 | 298.30 | -1.70 | -0.57  |
| 4           | 400.00 | 399.20 | -0.80 | -0.20  |
| AVERAGE (%) |        |        |       |        |

Calibrated By: (Mr. Arjun Sahani) Field Environmental Scientist (F)  
 Approved By: (Mr. Sarfath Jeyaram) Assistant General Manager

FORM NO. F-0002 REVISION NO.: ISSUE DATE: 09/04/22

**ALS** **MULTIPOINT CALIBRATION REPORT**

Calibration Date: 4-Jul-24 Equipment Name: SO2 Analyzer  
 Manufacturer: Teledyne API Model: 100E  
 Serial No.: 3469 Equipment ID: BKS\_F50772  
 Calibrator Manufacturer: Teledyne API Model: 720  
 Serial No.: 847  
 Sol. Gas Concentration (PPM): 88.3 Cylinder No.: GMS07222  
 Officer Pressure (psi): 1800 Certified By: Angus Inc.  
 Certified Date: 8-Feb-22 Expired Date: 8-Feb-30

| Point       | Ideal  | Actual | Error | %Error |
|-------------|--------|--------|-------|--------|
| ZERO        | 0.00   | 0.10   | 0.10  | 0.10   |
| 1           | 100.00 | 99.50  | -0.50 | -0.50  |
| 2           | 200.00 | 199.30 | -0.70 | -0.35  |
| 3           | 300.00 | 298.80 | -1.20 | -0.40  |
| 4           | 400.00 | 400.00 | 0.00  | 0.00   |
| AVERAGE (%) |        |        |       |        |

Calibrated By: (Mr. Arjun Sahani) Field Environmental Scientist (F)  
 Approved By: (Mr. Sarfath Jeyaram) Assistant General Manager

FORM NO. F-0002 REVISION NO.: ISSUE DATE: 09/04/22

**J NAC** **CERTIFICATE OF CALIBRATION**

Calibration Date: 4-Jul-24 Equipment Name: SO2 Analyzer  
 Manufacturer: Teledyne API Model: 100E  
 Serial No.: 3469 Equipment ID: BKS\_F50772  
 Calibrator Manufacturer: Teledyne API Model: 720  
 Serial No.: 847  
 Sol. Gas Concentration (PPM): 88.3 Cylinder No.: GMS07222  
 Officer Pressure (psi): 1800 Certified By: Angus Inc.  
 Certified Date: 8-Feb-22 Expired Date: 8-Feb-30

| Point       | Ideal  | Actual | Error | %Error |
|-------------|--------|--------|-------|--------|
| ZERO        | 0.00   | 0.10   | 0.10  | 0.10   |
| 1           | 100.00 | 99.50  | -0.50 | -0.50  |
| 2           | 200.00 | 199.30 | -0.70 | -0.35  |
| 3           | 300.00 | 298.80 | -1.20 | -0.40  |
| 4           | 400.00 | 400.00 | 0.00  | 0.00   |
| AVERAGE (%) |        |        |       |        |

Calibrated By: (Mr. Arjun Sahani) Field Environmental Scientist (F)  
 Approved By: (Mr. Sarfath Jeyaram) Assistant General Manager

FORM NO. F-0002 REVISION NO.: ISSUE DATE: 09/04/22

**J NAC** **CERTIFICATE OF CALIBRATION**

Calibration Date: 4-Jul-24 Equipment Name: SO2 Analyzer  
 Manufacturer: Teledyne API Model: 100E  
 Serial No.: 3469 Equipment ID: BKS\_F50772  
 Calibrator Manufacturer: Teledyne API Model: 720  
 Serial No.: 847  
 Sol. Gas Concentration (PPM): 88.3 Cylinder No.: GMS07222  
 Officer Pressure (psi): 1800 Certified By: Angus Inc.  
 Certified Date: 8-Feb-22 Expired Date: 8-Feb-30

| Point       | Ideal  | Actual | Error | %Error |
|-------------|--------|--------|-------|--------|
| ZERO        | 0.00   | 0.10   | 0.10  | 0.10   |
| 1           | 100.00 | 99.50  | -0.50 | -0.50  |
| 2           | 200.00 | 199.30 | -0.70 | -0.35  |
| 3           | 300.00 | 298.80 | -1.20 | -0.40  |
| 4           | 400.00 | 400.00 | 0.00  | 0.00   |
| AVERAGE (%) |        |        |       |        |

Calibrated By: (Mr. Arjun Sahani) Field Environmental Scientist (F)  
 Approved By: (Mr. Sarfath Jeyaram) Assistant General Manager

FORM NO. F-0002 REVISION NO.: ISSUE DATE: 09/04/22

**J NAC** **CERTIFICATE OF CALIBRATION**

Calibration Date: 4-Jul-24 Equipment Name: SO2 Analyzer  
 Manufacturer: Teledyne API Model: 100E  
 Serial No.: 3469 Equipment ID: BKS\_F50772  
 Calibrator Manufacturer: Teledyne API Model: 720  
 Serial No.: 847  
 Sol. Gas Concentration (PPM): 88.3 Cylinder No.: GMS07222  
 Officer Pressure (psi): 1800 Certified By: Angus Inc.  
 Certified Date: 8-Feb-22 Expired Date: 8-Feb-30

| Point       | Ideal  | Actual | Error | %Error |
|-------------|--------|--------|-------|--------|
| ZERO        | 0.00   | 0.10   | 0.10  | 0.10   |
| 1           | 100.00 | 99.50  | -0.50 | -0.50  |
| 2           | 200.00 | 199.30 | -0.70 | -0.35  |
| 3           | 300.00 | 298.80 | -1.20 | -0.40  |
| 4           | 400.00 | 400.00 | 0.00  | 0.00   |
| AVERAGE (%) |        |        |       |        |

Calibrated By: (Mr. Arjun Sahani) Field Environmental Scientist (F)  
 Approved By: (Mr. Sarfath Jeyaram) Assistant General Manager

FORM NO. F-0002 REVISION NO.: ISSUE DATE: 09/04/22

**J NAC** **CERTIFICATE OF CALIBRATION**

Calibration Date: 4-Jul-24 Equipment Name: SO2 Analyzer  
 Manufacturer: Teledyne API Model: 100E  
 Serial No.: 3469 Equipment ID: BKS\_F50772  
 Calibrator Manufacturer: Teledyne API Model: 720  
 Serial No.: 847  
 Sol. Gas Concentration (PPM): 88.3 Cylinder No.: GMS07222  
 Officer Pressure (psi): 1800 Certified By: Angus Inc.  
 Certified Date: 8-Feb-22 Expired Date: 8-Feb-30

| Point       | Ideal  | Actual | Error | %Error |
|-------------|--------|--------|-------|--------|
| ZERO        | 0.00   | 0.10   | 0.10  | 0.10   |
| 1           | 100.00 | 99.50  | -0.50 | -0.50  |
| 2           | 200.00 | 199.30 | -0.70 | -0.35  |
| 3           | 300.00 | 298.80 | -1.20 | -0.40  |
| 4           | 400.00 | 400.00 | 0.00  | 0.00   |
| AVERAGE (%) |        |        |       |        |

Calibrated By: (Mr. Arjun Sahani) Field Environmental Scientist (F)  
 Approved By: (Mr. Sarfath Jeyaram) Assistant General Manager

FORM NO. F-0002 REVISION NO.: ISSUE DATE: 09/04/22

**J NAC** **CERTIFICATE OF CALIBRATION**

Calibration Date: 4-Jul-24 Equipment Name: SO2 Analyzer  
 Manufacturer: Teledyne API Model: 100E  
 Serial No.: 3469 Equipment ID: BKS\_F50772  
 Calibrator Manufacturer: Teledyne API Model: 720  
 Serial No.: 847  
 Sol. Gas Concentration (PPM): 88.3 Cylinder No.: GMS07222  
 Officer Pressure (psi): 1800 Certified By: Angus Inc.  
 Certified Date: 8-Feb-22 Expired Date: 8-Feb-30

| Point       | Ideal  | Actual | Error | %Error |
|-------------|--------|--------|-------|--------|
| ZERO        | 0.00   | 0.10   | 0.10  | 0.10   |
| 1           | 100.00 | 99.50  | -0.50 | -0.50  |
| 2           | 200.00 | 199.30 | -0.70 | -0.35  |
| 3           | 300.00 | 298.80 | -1.20 | -0.40  |
| 4           | 400.00 | 400.00 | 0.00  | 0.00   |
| AVERAGE (%) |        |        |       |        |

Calibrated By: (Mr. Arjun Sahani) Field Environmental Scientist (F)  
 Approved By: (Mr. Sarfath Jeyaram) Assistant General Manager

FORM NO. F-0002 REVISION NO.: ISSUE DATE: 09/04/22





### References

|   |  |  |
|---|--|--|
| <p>Measurement Item<br/>MANUFACTURED MATERIAL TYPE<br/>SERIAL INFORMATION<br/>IS INVENTORY<br/>COMPOSITION AS-RECEIVED<br/>OUTLINES</p> | <p>One (1) copy to : Temperature sensor<br/>Revision<br/>118-945 3226-D<br/>ASAT<br/>PWS, HDSB<br/>AUS Item<br/>100 Pharmaceuticals Inc, Pharmaceutical Rd<br/>Pharmacy Lane (at Ph 5 on 1) Lang.<br/>Langford BC20100</p> | <p>Radioactive materials<br/>The temperature calibration was performed by a commercial laboratory. Report # 0552, 0553, 0554, 0555, 0556, 0557, 0558, 0559, 0560, 0561, 0562, 0563, 0564, 0565, 0566, 0567, 0568, 0569, 0570, 0571, 0572, 0573, 0574, 0575, 0576, 0577, 0578, 0579, 0580, 0581, 0582, 0583, 0584, 0585, 0586, 0587, 0588, 0589, 0590, 0591, 0592, 0593, 0594, 0595, 0596, 0597, 0598, 0599, 0600, 0601, 0602, 0603, 0604, 0605, 0606, 0607, 0608, 0609, 0610, 0611, 0612, 0613, 0614, 0615, 0616, 0617, 0618, 0619, 0620, 0621, 0622, 0623, 0624, 0625, 0626, 0627, 0628, 0629, 0630, 0631, 0632, 0633, 0634, 0635, 0636, 0637, 0638, 0639, 0640, 0641, 0642, 0643, 0644, 0645, 0646, 0647, 0648, 0649, 0650, 0651, 0652, 0653, 0654, 0655, 0656, 0657, 0658, 0659, 0660, 0661, 0662, 0663, 0664, 0665, 0666, 0667, 0668, 0669, 0670, 0671, 0672, 0673, 0674, 0675, 0676, 0677, 0678, 0679, 0680, 0681, 0682, 0683, 0684, 0685, 0686, 0687, 0688, 0689, 0690, 0691, 0692, 0693, 0694, 0695, 0696, 0697, 0698, 0699, 0700, 0701, 0702, 0703, 0704, 0705, 0706, 0707, 0708, 0709, 0710, 0711, 0712, 0713, 0714, 0715, 0716, 0717, 0718, 0719, 0720, 0721, 0722, 0723, 0724, 0725, 0726, 0727, 0728, 0729, 0730, 0731, 0732, 0733, 0734, 0735, 0736, 0737, 0738, 0739, 0740, 0741, 0742, 0743, 0744, 0745, 0746, 0747, 0748, 0749, 0750, 0751, 0752, 0753, 0754, 0755, 0756, 0757, 0758, 0759, 0760, 0761, 0762, 0763, 0764, 0765, 0766, 0767, 0768, 0769, 0770, 0771, 0772, 0773, 0774, 0775, 0776, 0777, 0778, 0779, 0780, 0781, 0782, 0783, 0784, 0785, 0786, 0787, 0788, 0789, 0790, 0791, 0792, 0793, 0794, 0795, 0796, 0797, 0798, 0799, 0800, 0801, 0802, 0803, 0804, 0805, 0806, 0807, 0808, 0809, 0810, 0811, 0812, 0813, 0814, 0815, 0816, 0817, 0818, 0819, 0820, 0821, 0822, 0823, 0824, 0825, 0826, 0827, 0828, 0829, 0830, 0831, 0832, 0833, 0834, 0835, 0836, 0837, 0838, 0839, 0840, 0841, 0842, 0843, 0844, 0845, 0846, 0847, 0848, 0849, 0850, 0851, 0852, 0853, 0854, 0855, 0856, 0857, 0858, 0859, 0860, 0861, 0862, 0863, 0864, 0865, 0866, 0867, 0868, 0869, 0870, 0871, 0872, 0873, 0874, 0875, 0876, 0877, 0878, 0879, 0880, 0881, 0882, 0883, 0884, 0885, 0886, 0887, 0888, 0889, 0890, 0891, 0892, 0893, 0894, 0895, 0896, 0897, 0898, 0899, 0900, 0901, 0902, 0903, 0904, 0905, 0906, 0907, 0908, 0909, 0910, 0911, 0912, 0913, 0914, 0915, 0916, 0917, 0918, 0919, 0920, 0921, 0922, 0923, 0924, 0925, 0926, 0927, 0928, 0929, 0930, 0931, 0932, 0933, 0934, 0935, 0936, 0937, 0938, 0939, 0940, 0941, 0942, 0943, 0944, 0945, 0946, 0947, 0948, 0949, 0950, 0951, 0952, 0953, 0954, 0955, 0956, 0957, 0958, 0959, 0960, 0961, 0962, 0963, 0964, 0965, 0966, 0967, 0968, 0969, 0970, 0971, 0972, 0973, 0974, 0975, 0976, 0977, 0978, 0979, 0980, 0981, 0982, 0983, 0984, 0985, 0986, 0987, 0988, 0989, 0990, 0991, 0992, 0993, 0994, 0995, 0996, 0997, 0998, 0999, 1000, 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1011, 1012, 1013, 1014, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1024, 1025, 1026, 1027, 1028, 1029, 1030, 1031, 1032, 1033, 1034, 1035, 1036, 1037, 1038, 1039, 1040, 1041, 1042, 1043, 1044, 1045, 1046, 1047, 1048, 1049, 1050, 1051, 1052, 1053, 1054, 1055, 1056, 1057, 1058, 1059, 1060, 1061, 1062, 1063, 1064, 1065, 1066, 1067, 1068, 1069, 1070, 1071, 1072, 1073, 1074, 1075, 1076, 1077, 1078, 1079, 1080, 1081, 1082, 1083, 1084, 1085, 1086, 1087, 1088, 1089, 1090, 1091, 1092, 1093, 1094, 1095, 1096, 1097, 1098, 1099, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1118, 1119, 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1139, 1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1177, 1178, 1179, 1180, 1181, 1182, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201</p> |
|---|--|--|

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## Page 3 of 1 Page


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**MesaLabs**



**NVLAB**  
 NVLAB Lab Code 200661 Q  
 Calibration

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**Calibration Certificate**

**Certificate No** 616982

**Product** 2006 1000 Calibrator 5 (1) Measurement Unit

**Serial No** 181158

**Cal Date** 01-Aug-2004

**Sold To:**

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
42 test stations are performance accredited with BCO 17025 at Mesa Laboratories Inc. 12100 W. 6th Ave. Labworth, CO 80026 an ISO 17025:1997 accredited laboratory through NVLAB. This report shall not be reutilized without the written authorization of the laboratory. Any use outside the Terms of Calibration. This report must not be used to claim product certification, approval or endorsement by NVLAB, NIST or any agency of the U.S. Government.

**As Received Calibration Data**

| Velocity            | Dens. Deficit        | Lab Pressure    | 0.142 mmHg       |
|---------------------|----------------------|-----------------|------------------|
|                     |                      | Lab Temperature | 24.7 °C          |
| Measurement Reading | Lab Measured Reading | Correction      | As Received      |
| 0 cm                | 4800.01 mm           | -130.0%         | 0.0 %            |
| 0 cm                | 1000.00 mm           | 100.0%          | 0.0 %            |
| 0 mm                | 249.50 mm            | 100.0%          | 1.0 %            |
|                     |                      |                 | Out of Tolerance |

**Mesa Laboratories Standards Used**


| Description | Standard Serial Number | Expiration Date | Calibration Due Date |
|-------------|------------------------|-----------------|----------------------|
| 181158-200  | 177991                 | 10/2005         | 03/2006              |

Mesa Labs 6000 W. 121st & 39th Ave. Labworth, CO 80026 USA  
 303.787.8919 mesa.labs@mesalabs.com Mesa at the MESAfair

E:\Cal\2006\04\01\616982.qtd

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 E-mail: [info@anab.com](mailto:info@anab.com)  
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ANAB  
 American National Accreditation Board  
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 Phone: (303) 733-8600 Fax: (303) 733-8601  
 E-mail: [info@anab.com](mailto:info@anab.com)

---

**Scope of Calibration:** 10 (20) Inductors

**Certificate No.:** 4-12-011  
**Request No.:** Eng 2010-014

| Temperature<br>(°C) | Pressure<br>(kPa) | NDB<br>(µg/ml) | LUC<br>(100 ml) | Time<br>(seconds) | Uncertainty<br>(% max) |
|---------------------|-------------------|----------------|-----------------|-------------------|------------------------|
| 25.00               | 101.30            | 200            | 100 ml          | 10                | 1.0                    |
| 25.00               | 101.30            | 1000           | 100 ml          | 10                | 2.0                    |
| 25.00               | 101.30            | 2000           | 100 ml          | 10                | 2.0                    |
| 25.00               | 101.30            | 4000           | 100 ml          | 10                | 2.0                    |
| 25.00               | 101.30            | 8000           | 100 ml          | 10                | 2.0                    |
| 25.00               | 101.30            | 16000          | 100 ml          | 10                | 2.0                    |
| 25.00               | 101.30            | 32000          | 100 ml          | 10                | 2.0                    |
| 25.00               | 101.30            | 64000          | 100 ml          | 10                | 2.0                    |
| 25.00               | 101.30            | 128000         | 100 ml          | 10                | 2.0                    |

**Note:** 1.11: Method 111, 100 µg/ml tolerance  
 1.14: Rejection Criteria: 1. standard deviation, two standard deviations (2σ)  
 1.5: Rejection criteria for non standard testing, one time use only

$$Q_{check} = Q_{ref} + \frac{P_{ref}}{P_{cal}} \times \frac{T_{ref}}{T_{cal}}$$

where: Q = Flow Rate      P = Absolute Pressure      T = Absolute Temperature  
 Meas = Measurement Condition      ref = Reference Condition

End of Certificate











Calibration Procedure : (SIPAC-01)

Calibration Method :

This equipment was calibrated by follow an IEC 60942 2003 Standard.  
The sound pressure level, frequency and total distortion of the sound calibrator was measured using the reference microphone.

Condition of this result of calibration :

1. Reference Standard Instruments

| Instrument              | Model    | Serial No. | Cert. No.    | Due Date |
|-------------------------|----------|------------|--------------|----------|
| Waveform Generator      | 33511B   | NV52302742 | IEC 60942:24 | 09-11-25 |
| Digital Multimeter      | 34461A   | NV52320106 | IEC 60942:24 | 13-11-25 |
| Digital Multimeter      | 34461A   | NV52320106 | IEC 60942:24 | 13-11-25 |
| Digital Multimeter      | 34461A   | NV52320106 | IEC 60942:24 | 13-11-25 |
| Programmable Attenuator | MAT 1070 | 62100114   | IEC 60942:24 | 09-11-25 |
| Condenser Microphone    | 4180     | 2977900    | AA 1001:24   | 12-11-25 |
| Measuring Amplifier     | NA-42KAI | 34360495   | AA 1001:24   | 09-11-25 |
| Audio Analyzer          | 33511B   | NV52302742 | IEC 60942:24 | 09-11-25 |

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

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

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Result of calibration :

1. Sound pressure level

| Specified sound pressure level (dB) | Measured value (dB) | Deviated Value (dB) | Uncertainty (dB) | Acceptance Limit (dB) |
|-------------------------------------|---------------------|---------------------|------------------|-----------------------|
| 94                                  | 94.34               | 0.34                | 0.14             | 0.40                  |

2. Frequency

| Specified Frequency (Hz) | Measured value (Hz) | Deviated value (%) | Uncertainty (%) | Acceptance Limit (%) |
|--------------------------|---------------------|--------------------|-----------------|----------------------|
| 1000                     | 1000.7              | 0.7                | 0.1             | 1.0                  |

3. Total distortion

| Measured total (%) | Uncertainty (%) | Acceptance Limit (%) |
|--------------------|-----------------|----------------------|
| 0.20               | 0.12            | 0.30                 |

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

End of Calibration Certificate

Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RMCN  
Model : NI-42 Microphone UK-42, Preamplifier M4-24  
Serial No : 0007259 / 150776 / 30771  
ID No : HKE 75076

Condition As Found : (GOOD)

Customer : ALSI LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATHANAKAN 40 PHATHANAKAN ROAD  
KIRITWANG PHATHANAKAN - MIET SUAN LUANG  
BANGKOK, 10250 THAILAND

Location :  
Ambient Temperature : 27.24 ± 0.1 °C  
Pressure : 1010.13 ± 0.1 hPa  
Relative Humidity : 68.6 ± 2.0 %

Received Date : 17 NOVEMBER 2023  
Calibration Date : 11-13 DECEMBER 2023  
Date of Issue : 18 DECEMBER 2023

Calibrated by : [Signature]

Approved by : [Signature]

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

SITHIPORN ASSOCIATES

Calibration Procedure : (SIPAC-01)

Calibration Method :

This equipment was calibrated by follow an IEC 61672 3 (2013) Standard for sound level meter (SLM).  
The SLM had type A and B weighting with A-weighting frequency and Reference Standard Instruments.

For noise results of each item were made by observation of each instrument display and also with SLM display.

Condition of this result of calibration :

1. Reference Standard Instruments

| Instrument              | Model    | Serial No. | Cert. No.    | Due Date |
|-------------------------|----------|------------|--------------|----------|
| Waveform Generator      | 33511B   | MY48017076 | IEC 60942:24 | 07-09-24 |
| Waveform Generator      | 33511B   | MY52302742 | IEC 60942:24 | 07-09-24 |
| Digital Multimeter      | 34461A   | MY52320106 | IEC 60942:24 | 13-11-24 |
| Digital Multimeter      | 34461A   | MY52320106 | IEC 60942:24 | 13-11-24 |
| Digital Multimeter      | 34461A   | MY52320106 | IEC 60942:24 | 13-11-24 |
| Programmable Attenuator | MAT 1070 | 62100114   | IEC 60942:24 | 07-09-24 |
| Condenser Microphone    | 4180     | 2977900    | AA 1001:23   | 10-10-24 |
| Measuring Amplifier     | NA-42KAI | 34360495   | AA 1001:23   | 10-10-24 |

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

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

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Summary of Measurement Results

| Parameter  | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|--|------------------|---|
| 1. Absolute sensitivity                              | 0.2              | N/A   |
| 2. Self-generated noise                              | 0.2              | N/A   |
| 3. Acoustical signal levels of frequency weightings  |                  |   |
| 3.1 250 Hz   | 0.3              | 0.8   |
| 3.2 1000 Hz  | 0.3              | 0.8   |
| 3.3 5000 Hz  | 0.3              | 0.7   |
| 4. Electrical signal levels of frequency weightings  |                  |   |
| 4.1 For 250 Hz to 4 kHz                              | 0.3              | 0.8   |
| 4.2 For 4 kHz to 20 kHz                              | 0.3              | 0.7   |
| 5. Frequency and noise weightings at 1 kHz           | 0.2              | 0.2   |
| 6. Long-term stability                               | 0.3              | 0.4   |
| 7. Level linearity on the reference level range      | 0.2              | 0.3   |
| 8. Level linearity, excluding the level range around | 0.2              | 0.3   |
| 9. Time base response                                | 0.2              | 0.3   |
| 10. Peak-to-peak level                               | 0.2              | 0.3%  |
| 11. Overall accuracy                                 | 0.2              | 0.2%  |
| 12. High level stability                             | 0.3              | 0.1   |

Result of calibration :

1. Absolute sensitivity

| Reference Acoustic Signal (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|--------------------------------|---------------------|---------------------|-----------------------|
| 92.9 (F150)                    | 93.9                | 0.9                 | +0.3                  |

2. Self-generated noise

| Measured Value (dB) |
|---------------------|
| 56.3                |

3. The microphone's self-noise level was measured by electrical signal input device

| Frequency Weighting | Measured value (dB) |
|---------------------|---------------------|
| A-weight            | 23.8                |
| C-weight            | 23.8                |
| Flat                | 23.8                |

3. Acoustical signal levels of frequency weightings

Mean free field acoustic response at a level of 94 dB

| Frequency (Hz) | Deviation from reference frequency weighting response curve (dB) | Acceptance Limit |
|----------------|--|------------------|
| 125            | 0.1  | +0.5             |
| 1000           | 0.0  | +0.0             |
| 5000           | -0.2   | +0.0             |

4. Electrical signal levels of frequency weightings

| Frequency (Hz) | Deviation from reference frequency weighting response curve (dB) | Acceptance Limit |
|----------------|--|------------------|
| 250            | 0.0  | +0.3             |
| 1000           | 0.0  | +0.3             |
| 5000           | 0.0  | +0.3             |
| 10000          | 0.0  | +0.3             |
| 20000          | 0.0  | +0.3             |
| 40000          | 0.0  | +0.3             |
| 80000          | 0.0  | +0.3             |

5. Frequency and noise weightings at 1 kHz

| Frequency Weighting | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|---------------------|------------------------|---------------------|---------------------|-----------------------|
| A-weight            | 94.0                   | 94.0                | 0.0                 | +0.2                  |
| C-weight            | 94.0                   | 94.0                | 0.0                 | +0.2                  |
| Flat                | 94.0                   | 94.0                | 0.0                 | +0.2                  |

5.2 Time weighting at 1 kHz

| Frequency Weighting | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|---------------------|------------------------|---------------------|---------------------|-----------------------|
| Fast                | 94.0                   | 94.0                | 0.0                 | +0.3                  |
| Slow                | 94.0                   | 94.0                | 0.0                 | +0.3                  |
| Imp                 | 94.0                   | 94.0                | 0.0                 | +0.3                  |

6. Long-term stability

| Frequency Weighting | SLM Display at Start (dB) | SLM Display at End (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|---------------------|---------------------------|-------------------------|---------------------|-----------------------|
| A-weight            | 94.0                      | 94.0                    | 0.0                 | +0.3                  |

7. Level linearity on the reference level range

| Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|------------------------|---------------------|---------------------|-----------------------|
| 94.0                   | 94.0                | 0.0                 | +0.3                  |
| 96.0                   | 96.0                | 0.0                 | +0.3                  |
| 98.0                   | 98.0                | 0.0                 | +0.3                  |
| 100.0                  | 100.0               | 0.0                 | +0.3                  |
| 102.0                  | 102.0               | 0.0                 | +0.3                  |
| 104.0                  | 104.0               | 0.0                 | +0.3                  |
| 106.0                  | 106.0               | 0.0                 | +0.3                  |
| 108.0                  | 108.0               | 0.0                 | +0.3                  |
| 110.0                  | 110.0               | 0.0                 | +0.3                  |
| 112.0                  | 112.0               | 0.0                 | +0.3                  |
| 114.0                  | 114.0               | 0.0                 | +0.3                  |
| 116.0                  | 116.0               | 0.0                 | +0.3                  |
| 118.0                  | 118.0               | 0.0                 | +0.3                  |
| 120.0                  | 120.0               | 0.0                 | +0.3                  |
| 122.0                  | 122.0               | 0.0                 | +0.3                  |
| 124.0                  | 124.0               | 0.0                 | +0.3                  |
| 126.0                  | 126.0               | 0.0                 | +0.3                  |
| 128.0                  | 128.0               | 0.0                 | +0.3                  |
| 130.0                  | 130.0               | 0.0                 | +0.3                  |
| 132.0                  | 132.0               | 0.0                 | +0.3                  |
| 134.0                  | 134.0               | 0.0                 | +0.3                  |
| 136.0                  | 136.0               | 0.0                 | +0.3                  |
| 138.0                  | 138.0               | 0.0                 | +0.3                  |
| 140.0                  | 140.0               | 0.0                 | +0.3                  |
| 142.0                  | 142.0               | 0.0                 | +0.3                  |
| 144.0                  | 144.0               | 0.0                 | +0.3                  |
| 146.0                  | 146.0               | 0.0                 | +0.3                  |
| 148.0                  | 148.0               | 0.0                 | +0.3                  |
| 150.0                  | 150.0               | 0.0                 | +0.3                  |

8. Level linearity including the level range control

| Range | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|-------|------------------------|---------------------|---------------------|-----------------------|
| Auto  | 94.0                   | 94.0                | 0.0                 | +0.3                  |

9. Time level response

| Value | Time Period, Seconds, 1/s | Level, dBS | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|-------|---------------------------|------------|------------------------|---------------------|---------------------|-----------------------|
| Fast  | 0.25                      | 7          | 106.0                  | 107.4               | +1.4                | +1.0                  |
| Slow  | 2                         | 8          | 117.0                  | 117.4               | +0.4                | +0.3                  |
| Imp   | 200                       | 800        | 134.0                  | 134.1               | +0.1                | +0.3                  |
| Auto  | 2                         | 8          | 106.0                  | 106.4               | +0.4                | +0.3                  |
| Auto  | 0.25                      | 1          | 94.0                   | 94.0                | 0.0                 | +0.3                  |
| Auto  | 2                         | 8          | 106.0                  | 106.4               | +0.4                | +0.3                  |
| Auto  | 200                       | 800        | 134.0                  | 134.1               | +0.1                | +0.3                  |

10. Peak C sound level

| Number of cycles | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|------------------|------------------------|---------------------|---------------------|-----------------------|
| 10               | 134.0                  | 134.0               | 0.0                 | +0.3                  |
| 100              | 134.0                  | 134.0               | 0.0                 | +0.3                  |
| 1000             | 134.0                  | 134.0               | 0.0                 | +0.3                  |
| 10000            | 134.0                  | 134.0               | 0.0                 | +0.3                  |
| 100000           | 134.0                  | 134.0               | 0.0                 | +0.3                  |
| 1000000          | 134.0                  | 134.0               | 0.0                 | +0.3                  |

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : KION  
Model : NL-42 / Microphone UC-52 / Pre-amplifier NH-24  
Serial No. : 00572364 / 75001 / 75002  
ID No. : RKK\_F00860

Condition As Found : GOOD  
Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHAT THANAKAN 40 PHAT THANAKAN ROAD  
KHUANG PHAT THANAKAN KHUET SUAN UANG  
BANGKOK 10250 THAILAND

Location :  
Ambient Temperature :  $(23.0 \pm 0.1) ^\circ\text{C}$   
Pressure :  $(1013.0 \pm 0.1) \text{ hPa}$   
Relative Humidity :  $(50.0 \pm 2.0) \%$   
Received Date : 17 NOV 2023  
Calibration Date : 18 DEC 2023  
Date of Issue : 18 DEC 2023

Calibrated by : Natchanon Petchuam

Approved by : T. Petchuam  
(Thanaon Petchuam)

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Calibration Procedure : CPAC01

Calibration Method :  
This equipment was calibrated by based on IEC 61672:2003 Standard for sound level meter (SLM).  
The SLM had been to Acoustical and Electrical signal rate of frequency weighting with A-weight, standard and Reference Standard Instruments.  
For some results of each item were made by observation of each instrument display and also with SLM's display.

Condition of this result of calibration :

- Reference Standard Instruments :  

| Instrument              | Model  | Serial No. | Check No.  | Due Date |
|-------------------------|--------|------------|------------|----------|
| Standard Generator      | 332104 | MY40017076 | 17-0009-23 | 07-01-24 |
| Standard Generator      | 332110 | MY52502742 | 17-0009-23 | 07-01-24 |
| Digital Multimeter      | 3441A  | MY5220104  | 17-0009-23 | 07-01-24 |
| Digital Multimeter      | 3441A  | MY5220104  | 17-0009-23 | 07-01-24 |
| Digital Multimeter      | 3441A  | MY5220104  | 17-0009-23 | 07-01-24 |
| Programmable Attenuator | 8441A  | MY5220104  | 17-0009-23 | 07-01-24 |
| Condenser Microphone    | 8441A  | MY5220104  | 17-0009-23 | 07-01-24 |
| Measuring Amplifier     | 8441A  | MY5220104  | 17-0009-23 | 07-01-24 |
- This result of calibration was found accurate, as shown on date and place of calibration for the calibrated item only.
- This certificate is traceable to the international system of unit measured at :  
 1.1 National Institute of Standards and Technology (NIST) USA  
 1.2 National Institute of Standards and Technology (NIST) USA

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Continuation of Calibration Certificate

4. Electrical signal levels of frequency weightings

Weighting network response with reference to 1 kHz

| Frequency (Hz) | Flat | C-weight | A-weight | Acceptance Limits |
|----------------|------|----------|----------|-------------------|
| 50             | -0.1 | -0.1     | -0.1     | $\pm 0.2$         |
| 125            | -0.1 | -0.1     | -0.1     | $\pm 0.2$         |
| 250            | 0.0  | 0.0      | 0.0      | $\pm 0.2$         |
| 500            | 0.0  | 0.0      | 0.0      | $\pm 0.2$         |
| 1000           | 0.0  | 0.0      | 0.0      | $\pm 0.2$         |
| 2000           | 0.0  | 0.0      | 0.0      | $\pm 0.2$         |
| 4000           | 0.0  | 0.0      | 0.0      | $\pm 0.2$         |
| 8000           | 0.0  | 0.1      | 0.1      | $\pm 0.2$         |

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

| Frequency Weighting | Anticipated Value (dB) | Measured Value (dB) | Deviation (dB) | Acceptance Limits |
|---------------------|------------------------|---------------------|----------------|-------------------|
| A-weight            | 94.0                   | 94.0                | 0.0            | $\pm 0.2$         |
| C-weight            | 94.0                   | 94.0                | 0.0            | $\pm 0.2$         |
| Flat                | 94.0                   | 94.0                | 0.0            | $\pm 0.2$         |

5.2 Time weighting at 1 kHz

| Frequency Weighting | Anticipated Value (dB) | Measured Value (dB) | Deviation (dB) | Acceptance Limits |
|---------------------|------------------------|---------------------|----------------|-------------------|
| Fast                | 94.0                   | 94.0                | 0.0            | $\pm 0.2$         |
| Slow                | 94.0                   | 94.0                | 0.0            | $\pm 0.2$         |
| Imp                 | 94.0                   | 94.0                | 0.0            | $\pm 0.2$         |

6. Long-term stability

| Frequency Weighting | SLM Display at initial (dB) | SLM Display at final (dB) | Deviation (dB) | Acceptance Limits |
|---------------------|-----------------------------|---------------------------|----------------|-------------------|
| A-weight            | 94.0                        | 94.0                      | 0.0            | $\pm 0.2$         |

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Continuation of Calibration Certificate

11. Overload indication

| Position | Measured value (dB) | Deviation Value (dB) | Acceptance Limits |
|----------|---------------------|----------------------|-------------------|
| Forward  | 99.5                | -0.1                 | $\pm 0.2$         |

12. High level stability

| Frequency Weighting | SLM Display at initial (dB) | SLM Display at final (dB) | Deviation Value (dB) | Acceptance Limits |
|---------------------|-----------------------------|---------------------------|----------------------|-------------------|
| A-weight            | 137.0                       | 137.0                     | 0.0                  | $\pm 0.2$         |

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

End of Calibration Certificate

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Continuation of Calibration Certificate

Summary of Measurement Result :

| Parameter   | Pass | Fail | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|---|------|------|------------------|---|
| 1. Absolute sensitivity                             | ✓    |      | 0.2              | N/A   |
| 2. Self-generated noise                             | ✓    |      | 0.2              | N/A   |
| 3. Acoustical signal levels of frequency weightings | ✓    |      | 0.2              | 0.6   |
| 125 Hz  | ✓    |      | 0.2              | 0.6   |
| 1000 Hz   | ✓    |      | 0.2              | 0.6   |
| 1000 Hz   | ✓    |      | 0.2              | 0.6   |
| 4. Electrical signal levels of frequency weightings | ✓    |      | 0.2              | 0.6   |
| For 10 Hz to 1 kHz                                  | ✓    |      | 0.2              | 0.6   |
| For 4 kHz to 10 kHz                                 | ✓    |      | 0.2              | 0.6   |
| For 10 kHz to 20 kHz                                | ✓    |      | 0.2              | 0.6   |
| 5. Frequency and time weightings at 1 kHz           | ✓    |      | 0.2              | 0.2   |
| 6. Long-term stability                              | ✓    |      | 0.2              | 0.2   |
| 7. Level accuracy on the reference level range      | ✓    |      | 0.2              | 0.2   |
| 8. Level accuracy including the level range control | ✓    |      | 0.2              | 0.2   |
| 9. Time burst response                              | ✓    |      | 0.2              | 0.2   |
| 10. Peak C sound level                              | ✓    |      | 0.2              | 0.2   |
| 11. Overload indication                             | ✓    |      | 0.2              | 0.2   |
| 12. High level stability                            | ✓    |      | 0.2              | 0.2   |

Note : Pass/Fail evaluation for each parameter, will be considered together for the acceptance limit and the Maximum permitted uncertainty of measurement.

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Continuation of Calibration Certificate

1. Level accuracy on the reference level range

| Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limits |
|------------------------|---------------------|----------------------|-------------------|
| 120.0                  | 120.0               | 0.0                  | $\pm 0.2$         |
| 125.0                  | 125.0               | 0.0                  | $\pm 0.2$         |
| 130.0                  | 130.0               | 0.0                  | $\pm 0.2$         |
| 135.0                  | 135.0               | 0.0                  | $\pm 0.2$         |
| 140.0                  | 140.0               | 0.0                  | $\pm 0.2$         |
| 145.0                  | 145.0               | 0.0                  | $\pm 0.2$         |
| 150.0                  | 150.0               | 0.0                  | $\pm 0.2$         |
| 155.0                  | 155.0               | 0.0                  | $\pm 0.2$         |
| 160.0                  | 160.0               | 0.0                  | $\pm 0.2$         |
| 165.0                  | 165.0               | 0.0                  | $\pm 0.2$         |
| 170.0                  | 170.0               | 0.0                  | $\pm 0.2$         |
| 175.0                  | 175.0               | 0.0                  | $\pm 0.2$         |
| 180.0                  | 180.0               | 0.0                  | $\pm 0.2$         |
| 185.0                  | 185.0               | 0.0                  | $\pm 0.2$         |
| 190.0                  | 190.0               | 0.0                  | $\pm 0.2$         |
| 195.0                  | 195.0               | 0.0                  | $\pm 0.2$         |
| 200.0                  | 200.0               | 0.0                  | $\pm 0.2$         |
| 205.0                  | 205.0               | 0.0                  | $\pm 0.2$         |
| 210.0                  | 210.0               | 0.0                  | $\pm 0.2$         |
| 215.0                  | 215.0               | 0.0                  | $\pm 0.2$         |
| 220.0                  | 220.0               | 0.0                  | $\pm 0.2$         |
| 225.0                  | 225.0               | 0.0                  | $\pm 0.2$         |
| 230.0                  | 230.0               | 0.0                  | $\pm 0.2$         |
| 235.0                  | 235.0               | 0.0                  | $\pm 0.2$         |
| 240.0                  | 240.0               | 0.0                  | $\pm 0.2$         |
| 245.0                  | 245.0               | 0.0                  | $\pm 0.2$         |
| 250.0                  | 250.0               | 0.0                  | $\pm 0.2$         |

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Continuation of Calibration Certificate

8. Level accuracy including the level range control

| Range | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limits |
|-------|------------------------|---------------------|----------------------|-------------------|
| Fast  | 94.0                   | 94.0                | 0.0                  | $\pm 0.2$         |

9. Time burst response

| Time Weighting | Time burst duration, (s) | Cycle | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limits |
|----------------|--------------------------|-------|------------------------|---------------------|----------------------|-------------------|
| Fast           | 0.25                     | 1     | 100.0                  | 100.0               | 0.0                  | $\pm 0.2$         |
| Slow           | 2                        | 8     | 117.0                  | 117.0               | 0.0                  | $\pm 0.2$         |
| Imp            | 200                      | 800   | 134.0                  | 134.0               | 0.0                  | $\pm 0.2$         |
| Fast           | 2                        | 8     | 100.0                  | 100.0               | 0.0                  | $\pm 0.2$         |
| Slow           | 200                      | 800   | 127.0                  | 127.0               | 0.0                  | $\pm 0.2$         |
| Imp            | 2                        | 8     | 100.0                  | 100.0               | 0.0                  | $\pm 0.2$         |
| Fast           | 2                        | 8     | 100.0                  | 100.0               | 0.0                  | $\pm 0.2$         |
| Slow           | 200                      | 800   | 127.0                  | 127.0               | 0.0                  | $\pm 0.2$         |

10. Peak C sound level

| Number of cycle on test signal | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limits |
|--------------------------------|------------------------|---------------------|----------------------|-------------------|
| Continuous                     | 133.0                  | 133.0               | 0.0                  | $\pm 0.2$         |
| Other                          | 133.0                  | 133.0               | 0.0                  | $\pm 0.2$         |

| Number of cycle on test signal | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limits |
|--------------------------------|------------------------|---------------------|----------------------|-------------------|
| Continuous                     | 133.0                  | 133.0               | 0.0                  | $\pm 0.2$         |
| Forward half cycle             | 133.0                  | 133.0               | 0.0                  | $\pm 0.2$         |
| Reverse half cycle             | 133.0                  | 133.0               | 0.0                  | $\pm 0.2$         |

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INDIAN INSTITUTE OF METROLOGY AND TECHNOLOGICAL RESEARCH (IIMTR)

Request No. 21-67021

MTC No. ILM/ BP/ 1565157

### CALIBRATION CERTIFICATE

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.  
Address: 104 Phrasakorn Rd. Phrasakorn Rd. Khwaeng Phrasakorn, Khet Suan Luang, Bangkok 10250  
Calibrated at: Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Center  
S.C.U. Bangkok Industrial Estate, Subsector Rd. A, Mueang, Samut Prakan 10700

Instrument Calibrated: Ambient Environment  
Description: Second Level Meter  
Manufacturer: Ikon  
Model: NI-42  
Serial No.: 00070057 (ED: 0008 050870)  
Microphone: ETC-52 NI-17,197  
Prepared by: NIB 24 No. 13/28

- Standards used:
1. Hand Pans (100g, 500g, 1000g) N 60100494
  2. Condenser Microphone Head/Kar 4100/SN 289971
  3. Decade Attenuator Anal. AI 295 SN 0304002
  4. Function Generator Waveform Generator Agilent 33220A/SN MY 4002060
  5. Digital Function Synthesizer NI 1710 Series Instruments DI 192A/SN 12207
  6. Digital Multimeter Fluke 8820A/SN 4906007
  7. Electrophone Rite NI 325/SN 0302146
  8. Measuring Amplifier Model A at 2636/SN 1515434

Date of Receipt: 24 Jan 2024

Date of Calibration: 22 Jan 2024



INDIAN INSTITUTE OF METROLOGY AND TECHNOLOGICAL RESEARCH (IIMTR)

Request No. 21-67021

MTC No. ILM/ BP/ 1565157

- Power Amplifier Model Kua 270/SN 1515610
- Speaker Emmy Limited, Unit for Air Acoustic Power No. 215/39
- Digital Multimeter Agilent 344C1A/SN MY 4405560
- Impedance Analyzer Impedance 17A 30A/SN 722

#### Calibration Procedure

The instrument was calibrated by using reference procedures on CP 102-02 and CP 102-03 which were based on IEC 61072 (1) measurements. Second Level Meters (Part 3) (Indicate area) (30) (1) These calibration procedures were related to the electrical and acoustic signal. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an acoustic room with the comparison measurement method.

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

The information on actual reading is attached on each side and the uncertainty is given in the table.

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%

Date of Calibration: 22 Jan 2024



INDIAN INSTITUTE OF METROLOGY AND TECHNOLOGICAL RESEARCH (IIMTR)

Request No. 21-67021

MTC No. ILM/ BP/ 1565157

#### 1. Absolute Sensitivity

| Reference Signal | Measured value (dB) | Deviation | Acceptance limit | Uncertainty | Maximum permitted uncertainty |
|------------------|---------------------|-----------|------------------|-------------|-------------------------------|
| Signal 100       | 114.2               | 114.2     | 113.9            | 0.3         | 0.30                          |
| Signal 101       | 114.2               | 113.9     | 113.9            | 0.3         | 0.30                          |

Note: The external calibration adjustment was fully performed. The internal calibration adjustment was then corrected to the level of 113.9 dB.

#### 2. Self-generated noise

##### 2.1 Normal test

| Measured value | Uncertainty | Maximum permitted uncertainty |
|----------------|-------------|-------------------------------|
| 113.9          | 0.3         | 0.30                          |

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

| Frequency | Measured value (dB) | Uncertainty | Maximum permitted uncertainty |
|-----------|---------------------|-------------|-------------------------------|
| Weighting | 113.9               | 0.3         | 0.30                          |
| A-weight  | 113.9               | 0.3         | 0.30                          |
| C-weight  | 113.9               | 0.3         | 0.30                          |
| Flat      | 113.9               | 0.3         | 0.30                          |



INDIAN INSTITUTE OF METROLOGY AND TECHNOLOGICAL RESEARCH (IIMTR)

Request No. 21-67021

MTC No. ILM/ BP/ 1565157

#### 3. Acoustical signal test of frequency weightings

| Frequency (Hz) | Deviation from frequency reference (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|----------------|---|-----------------------|------------------|------------------------------------|
| 125            | -0.1                                    | 0.0                   | 0.3              | 0.30                               |
| 500            | 0.2                                     | 0.2                   | 0.3              | 0.30                               |
| 1000           | -0.3                                    | -0.3                  | 0.3              | 0.30                               |

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

| Frequency (Hz) | Deviation from frequency reference (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|----------------|---|-----------------------|------------------|------------------------------------|
| 125            | -0.1                                    | 0.0                   | 0.3              | 0.30                               |
| 500            | 0.2                                     | 0.2                   | 0.3              | 0.30                               |
| 1000           | -0.3                                    | -0.3                  | 0.3              | 0.30                               |
| 2000           | -0.3                                    | -0.3                  | 0.3              | 0.30                               |
| 4000           | -0.3                                    | -0.3                  | 0.3              | 0.30                               |
| 8000           | -0.3                                    | -0.3                  | 0.3              | 0.30                               |

Date of Calibration: 22 Jan 2024



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Request No. 21-67021

MTC No. ILM/ BP/ 1565157

#### 5. Long-term stability

| Time   | Measured value (dB) | Deviation from value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|--------|---------------------|---------------------------|-----------------------|------------------|------------------------------------|
| Before | 114.2               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| After  | 114.2               | 0.0                       | 0.3                   | 0.3              | 0.3                                |

#### 6. Frequency and true weightings at 1 kHz

| Frequency | Measured value (dB) | Deviation from value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|-----------|---------------------|---------------------------|-----------------------|------------------|------------------------------------|
| Weighting | 114.2               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| A-weight  | 114.2               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| C-weight  | 114.2               | 0.0                       | 0.3                   | 0.3              | 0.3                                |

#### 6.2 Time weightings at 1 kHz

| Frequency | Measured value (dB) | Deviation from value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|-----------|---------------------|---------------------------|-----------------------|------------------|------------------------------------|
| Weighting | 114.2               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| Fast      | 114.2               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| Slow      | 114.2               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| Imp       | 114.2               | 0.0                       | 0.3                   | 0.3              | 0.3                                |

Date of Calibration: 22 Jan 2024



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MTC No. ILM/ BP/ 1565157

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

| Frequency (Hz) | Measured value (dB) | Deviation from value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|----------------|---------------------|---------------------------|-----------------------|------------------|------------------------------------|
| 125            | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 500            | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 1000           | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 2000           | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 4000           | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 8000           | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |

Date of Calibration: 22 Jan 2024



INDIAN INSTITUTE OF METROLOGY AND TECHNOLOGICAL RESEARCH (IIMTR)

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#### 7. Level frequency on the reference level range (cont.)

| Frequency (Hz) | Measured value (dB) | Deviation from value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|----------------|---------------------|---------------------------|-----------------------|------------------|------------------------------------|
| 125            | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 500            | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 1000           | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 2000           | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 4000           | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 8000           | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |

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

| Range    | Measured value (dB) | Deviation from value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|----------|---------------------|---------------------------|-----------------------|------------------|------------------------------------|
| 125-1000 | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |

Date of Calibration: 22 Jan 2024



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

| Range    | Measured value (dB) | Deviation from value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|----------|---------------------|---------------------------|-----------------------|------------------|------------------------------------|
| 125-1000 | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |

#### 9. True level response

| Frequency | Measured value (dB) | Deviation from value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|-----------|---------------------|---------------------------|-----------------------|------------------|------------------------------------|
| 125       | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 500       | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 1000      | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 2000      | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 4000      | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 8000      | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |

Date of Calibration: 22 Jan 2024



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#### 10. Peak level response

| Frequency (Hz) | Measured value (dB) | Deviation from value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|----------------|---------------------|---------------------------|-----------------------|------------------|------------------------------------|
| 125            | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 500            | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 1000           | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 2000           | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 4000           | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |
| 8000           | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |

#### 11. Overload indication

| Frequency | Measured value (dB) | Deviation from value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|-----------|---------------------|---------------------------|-----------------------|------------------|------------------------------------|
| 125       | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |

#### 12. High level stability

| Frequency | Measured value (dB) | Deviation from value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|-----------|---------------------|---------------------------|-----------------------|------------------|------------------------------------|
| 125       | 113.9               | 0.0                       | 0.3                   | 0.3              | 0.3                                |

Calibrated by: [Signature]

Approved by: [Signature]

Date of Calibration: 22 Jan 2024

Date of Issue: 22 Jan 2024

Date of Calibration: 22 Jan 2024

Industrial Metrology and Testing Service Center  
Ref: 2012/15/1565157



THAILAND INSTITUTE OF METROLOGY AND TECHNOLOGICAL RESEARCH (TITM)

Request No. 21-47021

MTC No. EEI-BP-167-0167

### CALIBRATION CERTIFICATE

Submitted by: A15 Laboratory Group (Thailand) Co., Ltd.  
Address: 101 Phrasarakon Rd. Khlong Phrasarakon, Khlong Phrasarakon, Bangkok 10250  
Calibrated at: Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre  
No. 11, Bangkok International 1st Mile, Uthumphol Rd., Asoke, Samsat, Bangkok 10260

Instrument Calibrated: Sound Level Meter  
Model: NI-42  
Serial No.: 00296511 (02) (BKG) (S/N 00000000)  
Microphone: 1/2" 32 No. 179142  
Physical Data: 500 10 No. 37550  
Standards used:  
1. Basic Plan 1 (for Weight) 100.000 000000000000  
2. Caudex Microphone (BKG) 410.5 N 289971  
3. Decade Attenuator (BKG) AL 20.5 N 0364602  
4. Function Arbitrary Waveform Generator Agilent 33220A NMY 4404268  
5. Digital Function Synthesizer M. H. Instruments (UK) 103A N 12207  
6. Digital Multimeter (BKG) 8520A S N 406407  
7. Transducer (BKG) NC 72 N 040244  
8. Metering Amplifier (BKG) 2030 S N 133744

Date of Receipt: 24 Jan 2024  
Date of Calibration: 27 Feb 2024



THAILAND INSTITUTE OF METROLOGY AND TECHNOLOGICAL RESEARCH (TITM)

Request No. 21-47022

MTC No. EEI-BP-167-0167

1. Power Amplifier (BKG) 100.000 000000000000  
2. Speaker (BKG) 100.000 000000000000  
3. Digital Multimeter (BKG) 8520A S N 406407  
4. Digital Multimeter (BKG) 8520A S N 406407  
5. Digital Multimeter (BKG) 8520A S N 406407  
6. Digital Multimeter (BKG) 8520A S N 406407  
7. Digital Multimeter (BKG) 8520A S N 406407  
8. Digital Multimeter (BKG) 8520A S N 406407

Calibration Procedure: This instrument was calibrated by using calibration procedures in IEC 61010-2 and IEC 61010-3. The calibration procedures are related to the electrical and electronic signal test. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic chamber with the comparison measurement method.

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

The calibration is a standard reading is attached herewith and the uncertainty limits are stated to be in accordance with the requirements.

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%.

Date of Calibration: 27 Feb 2024



THAILAND INSTITUTE OF METROLOGY AND TECHNOLOGICAL RESEARCH (TITM)

Request No. 21-47023

MTC No. EEI-BP-167-0167

### 1. Absolute Sensitivity

| Reference Name | Measured value (dB) | Deviation | Uncertainty | Maximum permitted uncertainty |
|----------------|---------------------|-----------|-------------|-------------------------------|
| Signal (dB)    | 115.97              | 0.00      | 0.00        | 0.00                          |

Note: The external calibration adjustment was fully performed. The internal calibration adjustment was not completed at the display of 115.97 dB.

### 2. Self-generated noise

| Measured value | Uncertainty | Maximum permitted uncertainty |
|----------------|-------------|-------------------------------|
| 115.97         | 0.00        | 0.00                          |

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

| Frequency | Measured value (dB) | Deviation | Maximum permitted uncertainty |
|-----------|---------------------|-----------|-------------------------------|
| 100 Hz    | 115.97              | 0.00      | 0.00                          |
| 1000 Hz   | 115.97              | 0.00      | 0.00                          |
| 10000 Hz  | 115.97              | 0.00      | 0.00                          |

Date of Calibration: 27 Feb 2024



THAILAND INSTITUTE OF METROLOGY AND TECHNOLOGICAL RESEARCH (TITM)

Request No. 21-47021

MTC No. EEI-BP-167-0167

### 1. Annualized signal test of frequency weightings

| Frequency (Hz) | Measured value (dB) | Deviation | Uncertainty | Maximum permitted uncertainty |
|----------------|---------------------|-----------|-------------|-------------------------------|
| 125            | 0.0                 | 0.0       | 0.0         | 0.0                           |
| 250            | 0.0                 | 0.0       | 0.0         | 0.0                           |
| 500            | 0.0                 | 0.0       | 0.0         | 0.0                           |
| 1000           | 0.0                 | 0.0       | 0.0         | 0.0                           |
| 2000           | 0.0                 | 0.0       | 0.0         | 0.0                           |
| 5000           | 0.0                 | 0.0       | 0.0         | 0.0                           |

### 4. Electrical signal test of frequency weightings

| Frequency (Hz) | Measured value (dB) | Deviation | Uncertainty | Maximum permitted uncertainty |
|----------------|---------------------|-----------|-------------|-------------------------------|
| 63             | 0.0                 | 0.0       | 0.0         | 0.0                           |
| 125            | 0.0                 | 0.0       | 0.0         | 0.0                           |
| 250            | 0.0                 | 0.0       | 0.0         | 0.0                           |
| 500            | 0.0                 | 0.0       | 0.0         | 0.0                           |
| 1000           | 0.0                 | 0.0       | 0.0         | 0.0                           |
| 2000           | 0.0                 | 0.0       | 0.0         | 0.0                           |
| 5000           | 0.0                 | 0.0       | 0.0         | 0.0                           |

Date of Calibration: 27 Feb 2024



THAILAND INSTITUTE OF METROLOGY AND TECHNOLOGICAL RESEARCH (TITM)

Request No. 21-47021

MTC No. EEI-BP-167-0167

### 5. Long-term stability

| Time  | Measured value (dB) | Deviation | Uncertainty | Maximum permitted uncertainty |
|-------|---------------------|-----------|-------------|-------------------------------|
| 1000  | 0.0                 | 0.0       | 0.0         | 0.0                           |
| 10000 | 0.0                 | 0.0       | 0.0         | 0.0                           |

### 6. Frequency weightings at 1 kHz

| Frequency (Hz) | Measured value (dB) | Deviation | Uncertainty | Maximum permitted uncertainty |
|----------------|---------------------|-----------|-------------|-------------------------------|
| 1000           | 0.0                 | 0.0       | 0.0         | 0.0                           |
| 10000          | 0.0                 | 0.0       | 0.0         | 0.0                           |

### 6.2 Time weightings at 1 kHz

| Frequency (Hz) | Measured value (dB) | Deviation | Uncertainty | Maximum permitted uncertainty |
|----------------|---------------------|-----------|-------------|-------------------------------|
| 1000           | 0.0                 | 0.0       | 0.0         | 0.0                           |
| 10000          | 0.0                 | 0.0       | 0.0         | 0.0                           |

Date of Calibration: 27 Feb 2024

Request No. 21-47021

MTC No. EEI-BP-167-0167

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

| Anticipated value (dB) | Measured value (dB) | Deviation | Uncertainty | Maximum permitted uncertainty |
|------------------------|---------------------|-----------|-------------|-------------------------------|
| 137                    | 137.0               | 0.0       | 0.0         | 0.0                           |
| 136                    | 136.0               | 0.0       | 0.0         | 0.0                           |
| 135                    | 135.0               | 0.0       | 0.0         | 0.0                           |
| 134                    | 134.0               | 0.0       | 0.0         | 0.0                           |
| 133                    | 133.0               | 0.0       | 0.0         | 0.0                           |
| 132                    | 132.0               | 0.0       | 0.0         | 0.0                           |
| 131                    | 131.0               | 0.0       | 0.0         | 0.0                           |
| 130                    | 130.0               | 0.0       | 0.0         | 0.0                           |
| 129                    | 129.0               | 0.0       | 0.0         | 0.0                           |
| 128                    | 128.0               | 0.0       | 0.0         | 0.0                           |
| 127                    | 127.0               | 0.0       | 0.0         | 0.0                           |
| 126                    | 126.0               | 0.0       | 0.0         | 0.0                           |
| 125                    | 125.0               | 0.0       | 0.0         | 0.0                           |
| 124                    | 124.0               | 0.0       | 0.0         | 0.0                           |
| 123                    | 123.0               | 0.0       | 0.0         | 0.0                           |
| 122                    | 122.0               | 0.0       | 0.0         | 0.0                           |
| 121                    | 121.0               | 0.0       | 0.0         | 0.0                           |
| 120                    | 120.0               | 0.0       | 0.0         | 0.0                           |
| 119                    | 119.0               | 0.0       | 0.0         | 0.0                           |
| 118                    | 118.0               | 0.0       | 0.0         | 0.0                           |
| 117                    | 117.0               | 0.0       | 0.0         | 0.0                           |
| 116                    | 116.0               | 0.0       | 0.0         | 0.0                           |
| 115                    | 115.0               | 0.0       | 0.0         | 0.0                           |
| 114                    | 114.0               | 0.0       | 0.0         | 0.0                           |
| 113                    | 113.0               | 0.0       | 0.0         | 0.0                           |
| 112                    | 112.0               | 0.0       | 0.0         | 0.0                           |
| 111                    | 111.0               | 0.0       | 0.0         | 0.0                           |
| 110                    | 110.0               | 0.0       | 0.0         | 0.0                           |
| 109                    | 109.0               | 0.0       | 0.0         | 0.0                           |
| 108                    | 108.0               | 0.0       | 0.0         | 0.0                           |
| 107                    | 107.0               | 0.0       | 0.0         | 0.0                           |
| 106                    | 106.0               | 0.0       | 0.0         | 0.0                           |
| 105                    | 105.0               | 0.0       | 0.0         | 0.0                           |
| 104                    | 104.0               | 0.0       | 0.0         | 0.0                           |
| 103                    | 103.0               | 0.0       | 0.0         | 0.0                           |
| 102                    | 102.0               | 0.0       | 0.0         | 0.0                           |
| 101                    | 101.0               | 0.0       | 0.0         | 0.0                           |
| 100                    | 100.0               | 0.0       | 0.0         | 0.0                           |
| 99                     | 99.0                | 0.0       | 0.0         | 0.0                           |
| 98                     | 98.0                | 0.0       | 0.0         | 0.0                           |
| 97                     | 97.0                | 0.0       | 0.0         | 0.0                           |
| 96                     | 96.0                | 0.0       | 0.0         | 0.0                           |
| 95                     | 95.0                | 0.0       | 0.0         | 0.0                           |
| 94                     | 94.0                | 0.0       | 0.0         | 0.0                           |
| 93                     | 93.0                | 0.0       | 0.0         | 0.0                           |
| 92                     | 92.0                | 0.0       | 0.0         | 0.0                           |
| 91                     | 91.0                | 0.0       | 0.0         | 0.0                           |
| 90                     | 90.0                | 0.0       | 0.0         | 0.0                           |
| 89                     | 89.0                | 0.0       | 0.0         | 0.0                           |
| 88                     | 88.0                | 0.0       | 0.0         | 0.0                           |
| 87                     | 87.0                | 0.0       | 0.0         | 0.0                           |
| 86                     | 86.0                | 0.0       | 0.0         | 0.0                           |
| 85                     | 85.0                | 0.0       | 0.0         | 0.0                           |
| 84                     | 84.0                | 0.0       | 0.0         | 0.0                           |
| 83                     | 83.0                | 0.0       | 0.0         | 0.0                           |
| 82                     | 82.0                | 0.0       | 0.0         | 0.0                           |
| 81                     | 81.0                | 0.0       | 0.0         | 0.0                           |
| 80                     | 80.0                | 0.0       | 0.0         | 0.0                           |
| 79                     | 79.0                | 0.0       | 0.0         | 0.0                           |
| 78                     | 78.0                | 0.0       | 0.0         | 0.0                           |
| 77                     | 77.0                | 0.0       | 0.0         | 0.0                           |
| 76                     | 76.0                | 0.0       | 0.0         | 0.0                           |
| 75                     | 75.0                | 0.0       | 0.0         | 0.0                           |
| 74                     | 74.0                | 0.0       | 0.0         | 0.0                           |
| 73                     | 73.0                | 0.0       | 0.0         | 0.0                           |
| 72                     | 72.0                | 0.0       | 0.0         | 0.0                           |
| 71                     | 71.0                | 0.0       | 0.0         | 0.0                           |
| 70                     | 70.0                | 0.0       | 0.0         | 0.0                           |
| 69                     | 69.0                | 0.0       | 0.0         | 0.0                           |
| 68                     | 68.0                | 0.0       | 0.0         | 0.0                           |
| 67                     | 67.0                | 0.0       | 0.0         | 0.0                           |
| 66                     | 66.0                | 0.0       | 0.0         | 0.0                           |
| 65                     | 65.0                | 0.0       | 0.0         | 0.0                           |
| 64                     | 64.0                | 0.0       | 0.0         | 0.0                           |
| 63                     | 63.0                | 0.0       | 0.0         | 0.0                           |
| 62                     | 62.0                | 0.0       | 0.0         | 0.0                           |
| 61                     | 61.0                | 0.0       | 0.0         | 0.0                           |
| 60                     | 60.0                | 0.0       | 0.0         | 0.0                           |
| 59                     | 59.0                | 0.0       | 0.0         | 0.0                           |
| 58                     | 58.0                | 0.0       | 0.0         | 0.0                           |
| 57                     | 57.0                | 0.0       | 0.0         | 0.0                           |
| 56                     | 56.0                | 0.0       | 0.0         | 0.0                           |
| 55                     | 55.0                | 0.0       | 0.0         | 0.0                           |
| 54                     | 54.0                | 0.0       | 0.0         | 0.0                           |
| 53                     | 53.0                | 0.0       | 0.0         | 0.0                           |
| 52                     | 52.0                | 0.0       | 0.0         | 0.0                           |
| 51                     | 51.0                | 0.0       | 0.0         | 0.0                           |
| 50                     | 50.0                | 0.0       | 0.0         | 0.0                           |
| 49                     | 49.0                | 0.0       | 0.0         | 0.0                           |
| 48                     | 48.0                | 0.0       | 0.0         | 0.0                           |
| 47                     | 47.0                | 0.0       | 0.0         | 0.0                           |
| 46                     | 46.0                | 0.0       | 0.0         | 0.0                           |
| 45                     | 45.0                | 0.0       | 0.0         | 0.0                           |
| 44                     | 44.0                | 0.0       | 0.0         | 0.0                           |
| 43                     | 43.0                | 0.0       | 0.0         | 0.0                           |
| 42                     | 42.0                | 0.0       | 0.0         | 0.0                           |
| 41                     | 41.0                | 0.0       | 0.0         | 0.0                           |
| 40                     | 40.0                | 0.0       | 0.0         | 0.0                           |
| 39                     | 39.0                | 0.0       | 0.0         | 0.0                           |
| 38                     | 38.0                | 0.0       | 0.0         | 0.0                           |
| 37                     | 37.0                | 0.0       | 0.0         | 0.0                           |
| 36                     | 36.0                | 0.0       | 0.0         | 0.0                           |
| 35                     | 35.0                | 0.0       | 0.0         | 0.0                           |
| 34                     | 34.0                | 0.0       | 0.0         | 0.0                           |
| 33                     | 33.0                | 0.0       | 0.0         | 0.0                           |
| 32                     | 32.0                | 0.0       | 0.0         | 0.0                           |
| 31                     | 31.0                | 0.0       | 0.0         | 0.0                           |
| 30                     | 30.0                | 0.0       | 0.0         | 0.0                           |
| 29                     | 29.0                | 0.0       | 0.0         | 0.0                           |
| 28                     | 28.0                | 0.0       | 0.0         | 0.0                           |
| 27                     | 27.0                | 0.0       | 0.0         | 0.0                           |
| 26                     | 26.0                | 0.0       | 0.0         | 0.0                           |
| 25                     | 25.0                | 0.0       | 0.0         | 0.0                           |
| 24                     | 24.0                | 0.0       | 0.0         | 0.0                           |
| 23                     | 23.0                | 0.0       | 0.0         | 0.0                           |
| 22                     | 22.0                | 0.0       | 0.0         | 0.0                           |
| 21                     | 21.0                | 0.0       | 0.0         | 0.0                           |
| 20                     | 20.0                | 0.0       | 0.0         | 0.0                           |
| 19                     | 19.0                | 0.0       | 0.0         | 0.0                           |
| 18                     | 18.0                | 0.0       | 0.0         | 0.0                           |
| 17                     | 17.0                | 0.0       | 0.0         | 0.0                           |
| 16                     | 16.0                | 0.0       | 0.0         | 0.0                           |
| 15                     | 15.0                | 0.0       | 0.0         | 0.0                           |
| 14                     | 14.0                | 0.0       | 0.0         | 0.0                           |
| 13                     | 13.0                | 0.0       | 0.0         | 0.0                           |
| 12                     | 12.0                | 0.0       | 0.0         | 0.0                           |
| 11                     | 11.0                | 0.0       | 0.0         | 0.0                           |
| 10                     | 10.0                | 0.0       | 0.0         | 0.0                           |
| 9                      | 9.0                 | 0.0       | 0.0         | 0.0                           |
| 8                      | 8.0                 | 0.0       | 0.0         | 0.0                           |
| 7                      | 7.0                 | 0.0       | 0.0         | 0.0                           |
| 6                      | 6.0                 | 0.0       | 0.0         | 0.0                           |
| 5                      | 5.0                 | 0.0       | 0.0         | 0.0                           |
| 4                      | 4.0                 | 0.0       | 0.0         | 0.0                           |
| 3                      | 3.0                 | 0.0       | 0.0         | 0.0                           |
| 2                      | 2.0                 | 0.0       | 0.0         | 0.0                           |
| 1                      | 1.0                 | 0.0       | 0.0         | 0.0                           |
| 0                      | 0.0                 | 0.0       | 0.0         | 0.0                           |

Date of Calibration: 27 Feb 2024



THAILAND INSTITUTE OF METROLOGY AND TECHNOLOGICAL RESEARCH (TITM)

Request No. 21-47021

MTC No. EEI-BP-167-0167

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

| Anticipated value (dB) | Measured value (dB) | Deviation | Uncertainty | Maximum permitted uncertainty |
|------------------------|---------------------|-----------|-------------|-------------------------------|
| 56                     | 56.0                | 0.0       | 0.0         | 0.0                           |
| 54                     | 54.0                | 0.0       | 0.0         | 0.0                           |
| 52                     | 52.0                | 0.0       | 0.0         | 0.0                           |
| 50                     | 50.0                | 0.0       | 0.0         | 0.0                           |
| 48                     | 48.0                | 0.0       | 0.0         | 0.0                           |
| 46                     | 46.0                | 0.0       | 0.0         | 0.0                           |
| 44                     | 44.0                | 0.0       | 0.0         | 0.0                           |
| 42                     | 42.0                | 0.0       | 0.0         | 0.0                           |
| 40                     | 40.0                | 0.0       | 0.0         | 0.0                           |
| 38                     | 38.0                | 0.0       | 0.0         | 0.0                           |
| 36                     | 36.0                | 0.0       | 0.0         | 0.0                           |
| 34                     | 34.0                | 0.0       | 0.0         | 0.0                           |
| 32                     | 32.0                | 0.0       | 0.0         | 0.0                           |
| 30                     | 30.0                | 0.0       | 0.0         | 0.0                           |
| 28                     | 28.0                | 0.0       | 0.0         | 0.0                           |
| 26                     | 26.0                | 0.0       | 0.0         | 0.0                           |
| 24                     | 24.0                | 0.0       | 0.0         | 0.0                           |
| 22                     | 22.0                | 0.0       | 0.0         | 0.0                           |
| 20                     | 20.0                | 0.0       | 0.0         | 0.0                           |
| 18                     | 18.0                | 0.0       | 0.0         | 0.0                           |
| 16                     | 16.0                | 0.0       | 0.0         | 0.0                           |
| 14                     | 14.0                | 0.0       | 0.0         | 0.0                           |
| 12                     | 12.0                | 0.0       | 0.0         | 0.0                           |
| 10                     | 10.0                | 0.0       | 0.0         | 0.0                           |
| 8                      | 8.0                 | 0.0       | 0.0         | 0.0                           |
| 6                      | 6.0                 | 0.0       | 0.0         | 0.0                           |
| 4                      | 4.0                 | 0.0       | 0.0         | 0.0                           |
| 2                      | 2.0                 | 0.0       | 0.0         | 0.0                           |
| 0                      | 0.0                 | 0.0       | 0.0         | 0.0                           |

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

| Anticipated value (dB) | Measured value (dB) | Deviation | Uncertainty | Maximum permitted uncertainty |
|------------------------|---------------------|-----------|-------------|-------------------------------|
|------------------------|---------------------|-----------|-------------|-------------------------------|

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451/451/5 Sukhumvit Rd, Bangkok, Bangkok 10110 THAILAND  
Tel: 2433-9030 Fax: 2433-1679 e-mail: cal@stiporn.com.th; info@stiporn.com.th

Cert. No. : ACL33346  
Page : 1 of 3

Equipment : SOUND CALIBRATOR  
Manufacturer : RION  
Model : NR-94  
Serial No : 3442367  
ID No. : MKC 150618

Condition As Found : GOOD

Customer : AIS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTANAKAN 40, PHATTANAKAN ROAD,  
KHUANG PHATTANAKAN, KHUAT SUAN LUANG  
BANGKOK, 10250 THAILAND

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

Received Date : 26 NOVEMBER 2023  
Calibration Date : 19 DECEMBER 2023  
Date of Issue : 22 DECEMBER 2023

Calibrated by : Natthas Panchuan

Approved by : T. Petchu  
( Thanat Petchu )

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

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL33346  
Job No. : VCB7AC0005  
Page : 2 of 3

Calibration Procedure : UP-AL-03

Calibration Method :  
The equipment was calibrated by based on IEC 60959:2003 Standard.  
The sound pressure level, frequency and level deviation of the sound calibrator was measured using the reference microphone

Condition of this result of calibration :  
1. Reference Standard Instruments

| Instrument              | Model    | Serial No. | Cert. No.  | Exp. Date |
|-------------------------|----------|------------|------------|-----------|
| Waveform Generator      | 31411B   | MY5232142  | EF-0910-23 | 07-FEB-24 |
| Digital Multimeter      | 33401A   | MY5232014  | EF-0910-23 | 13-FEB-24 |
| Digital Multimeter      | 33401A   | MY5232074  | EF-0910-23 | 13-FEB-24 |
| Digital Multimeter      | 33401A   | MY5232074  | EF-0910-23 | 13-FEB-24 |
| Programmable Attenuator | MAT-1070 | 6210114    | EF-0910-23 | 08-FEB-24 |
| Condenser Microphone    | 4188     | 277700     | AA-1001-23 | 16-FEB-24 |
| Measuring Amplifier     | NA-418A  | 3456605    | AA-3002-23 | 16-FEB-24 |
| Audio Analyzer          | AVR-330A | V254N040   | EF-0910-23 | 10-FEB-24 |

2. The result of calibration was found accurate as shown on date and place of calibration for this calibration item only.  
3. This certificate is provided to the international system of unit maintained at:  
3.1 National Institute of Metrology (Thailand)  
3.2 Thailand Institute of Scientific and Technological Research (TISTR)

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL33346  
Job No. : VCB7AC0005  
Page : 3 of 3

Result of calibration:

1. Sound pressure level

| Specified sound pressure level (dB) | Measured value (dB) | Deviated value (dB) | Uncertainty (dB) | Acceptance Limit (dB) |
|-------------------------------------|---------------------|---------------------|------------------|-----------------------|
| 94                                  | 94.01               | 0.01                | 0.14             | 0.40                  |

2. Frequency

| Specified Frequency (Hz) | Measured value (Hz) | Deviated value (Hz) | Uncertainty (Hz) | Acceptance Limit (Hz) |
|--------------------------|---------------------|---------------------|------------------|-----------------------|
| 1000                     | 1004.3              | 4.3                 | 0.1              | 1.0                   |

3. Total distortion

| Measured value (%) | Uncertainty (%) | Acceptance Limit (%) |
|--------------------|-----------------|----------------------|
| 1.45               | 0.10            | 3.0                  |

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

End of Calibration Certificate

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL33349  
Page : 1 of 3

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NR-42 / Microphone UC-52 / Pre-amplifier NR-24  
Serial No : 0026117 / 157764 / 40699  
ID No. : SBL 190107

Condition As Found : GOOD

Customer : AIS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTANAKAN 40, PHATTANAKAN ROAD,  
KHUANG PHATTANAKAN, KHUAT SUAN LUANG  
BANGKOK, 10250 THAILAND

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

Received Date : 07 NOVEMBER 2023  
Calibration Date : 29-30 NOVEMBER 2023  
Date of Issue : 06 DECEMBER 2023

Calibrated by : Natthas Panchuan

Approved by : T. Petchu  
( Thanat Petchu )

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

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL33349  
Job No. : VCB7AC0025  
Page : 2 of 3

Calibration Procedure : CB-AC-01

Calibration Method :  
This equipment was calibrated by based on IEC 61672-1:2013 Standard for sound level meter (SLM).  
The SLM had been to Acoustical and Electrical signal tests of frequency weighting with American chamber and Reference Source of frequencies.  
For test results of each item were made by observation of each instrument display and also with SLM's display.

Condition of this result of calibration :  
1. Reference Standard Instruments

| Instrument              | Model    | Serial No. | Cert. No.  | Exp. Date |
|-------------------------|----------|------------|------------|-----------|
| Waveform Generator      | 31411B   | MY5232142  | EF-0910-23 | 07-FEB-24 |
| Waveform Generator      | 31411B   | MY5232142  | EF-0910-23 | 07-FEB-24 |
| Digital Multimeter      | 33401A   | MY5232014  | EF-0910-23 | 13-FEB-24 |
| Digital Multimeter      | 33401A   | MY5232074  | EF-0910-23 | 13-FEB-24 |
| Digital Multimeter      | 33401A   | MY5232074  | EF-0910-23 | 13-FEB-24 |
| Programmable Attenuator | MAT-1070 | 6210114    | EF-0910-23 | 08-FEB-24 |
| Condenser Microphone    | 4188     | 277700     | AA-1001-23 | 16-FEB-24 |
| Measuring Amplifier     | NA-418A  | 3456605    | AA-3002-23 | 16-FEB-24 |

2. The result of calibration was found accurate as shown on date and place of calibration for this calibration item only.  
3. This certificate is provided to the international system of unit maintained at:  
3.1 National Institute of Metrology (Thailand)  
3.2 Thailand Institute of Scientific and Technological Research (TISTR)

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL33349  
Job No. : VCB7AC0025  
Page : 3 of 3

Summary of Measurement Result:

| Parameter  | Pass | Fail | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|--|------|------|------------------|---|
| 1. Absolute sensitivity                            | ✓    | -    | 0.2              | N/A   |
| 2. Self-generated noise                            | ✓    | -    | 0.2              | N/A   |
| 3. Acoustical signal tests of frequency weightings | ✓    | -    | 0.2              | 0.5   |
| 4. Electrical signal tests of frequency weightings | ✓    | -    | 0.2              | 0.5   |
| 5. Frequency and time weightings at 1 kHz          | ✓    | -    | 0.2              | 0.5   |
| 6. Long-term stability                             | ✓    | -    | 0.2              | 0.5   |
| 7. Level linearity on the reference level range    | ✓    | -    | 0.2              | 0.5   |
| 8. Level linearity on the level range control      | ✓    | -    | 0.2              | 0.5   |
| 9. Time base response                              | ✓    | -    | 0.2              | 0.5   |
| 10. Peak-to-peak level                             | ✓    | -    | 0.2              | 0.5   |
| 11. Over-modulation                                | ✓    | -    | 0.2              | 0.5   |
| 12. High-level overload                            | ✓    | -    | 0.2              | 0.5   |

Note: 1. From 1 kHz evaluation for each parameter  
2. All the uncertainty together from the acceptance limit and the Maximum permitted uncertainty of measurement

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Continuation of Calibration Certificate

Cert. No. : ACL33349  
Job No. : VCB7AC0025  
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Result of calibration:

1. Absolute sensitivity

| Reference Acoustic Signal (dB) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|--------------------------------|---------------------|----------------|-----------------------|
| 91.9 (91.9)                    | 91.9                | 0.0            | ±0.5                  |

2. Self-generated noise

2.1 Normal use

| Measured Value (dB) |
|---------------------|
| 16.6                |

2.2 The response of the sound level meter was explained by electrical signal input device.

| Frequency (Hz) | Measured value (dB) |
|----------------|---------------------|
| A-weight       | 14.6                |
| C-weight       | 20.4                |
| Flat           | 24.4                |

3. Acoustical signal tests of frequency weightings

Mean free-field acoustic response at a level of 94 dB

| Frequency (Hz) | Deviation from reference frequency weighting response curve (dB) |
|----------------|--|
| 125            | 0.8  |
| 1000           | 0.2  |
| 8000           | 0.4  |

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL33349  
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4. Electrical signal tests of frequency weightings

Frequency response with relative to 1 kHz

| Frequency (Hz) | Flat | C-weight | A-weight | Acceptance Limit |
|----------------|------|----------|----------|------------------|
| 63             | 0.0  | 0.1      | -0.1     | ±0.9             |
| 125            | 0.0  | 0.1      | -0.1     | ±1.5             |
| 250            | 0.1  | 0.1      | -0.1     | ±1.5             |
| 500            | 0.1  | 0.1      | -0.1     | ±1.5             |
| 1000           | 0.0  | 0.0      | 0.0      | ±1.5             |
| 2000           | 0.0  | 0.1      | 0.0      | ±2.0             |
| 4000           | 0.1  | 0.1      | 0.0      | ±3.0             |
| 8000           | 0.1  | 0.1      | 0.0      | ±3.0             |

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

| Frequency Weighting | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|---------------------|---------------------|---------------------|-----------------------|
| A-weight            | 94.0                | 94.0                | ±0.2                  |
| C-weight            | 94.0                | 94.0                | ±0.2                  |
| Flat                | 94.0                | 94.0                | ±0.2                  |

5.2 Time-weight up at 1 kHz

| Frequency Weighting | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|---------------------|---------------------|---------------------|-----------------------|
| Fast                | 94.1                | 94.1                | ±0.1                  |
| Slow                | 94.1                | 94.1                | ±0.1                  |
| Imp                 | 94.1                | 94.1                | ±0.1                  |

6. Long-term stability

| Frequency Weighting | SLM Display initial (dB) | S.M. Display at final (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|---------------------|--------------------------|----------------------------|---------------------|-----------------------|
| A-weight            | 94.1                     | 94.1                       | 0.0                 | ±0.1                  |

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL33349  
Job No. : VCB7AC0025  
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7. Level linearity on the reference level range

| Assigned Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|---------------------|---------------------|---------------------|-----------------------|
| 137.0               | 137.0               | 0.0                 | ±0.1                  |
| 136.0               | 136.1               | 0.1                 | ±0.1                  |
| 135.0               | 135.1               | 0.1                 | ±0.1                  |
| 134.0               | 134.1               | 0.1                 | ±0.1                  |
| 133.0               | 133.0               | 0.0                 | ±0.1                  |
| 132.0               | 132.0               | 0.0                 | ±0.1                  |
| 131.0               | 131.0               | 0.0                 | ±0.1                  |
| 130.0               | 130.0               | 0.0                 | ±0.1                  |
| 129.0               | 129.0               | 0.0                 | ±0.1                  |
| 128.0               | 128.0               | 0.0                 | ±0.1                  |
| 127.0               | 127.0               | 0.0                 | ±0.1                  |
| 126.0               | 126.0               | 0.0                 | ±0.1                  |
| 125.0               | 125.0               | 0.0                 | ±0.1                  |
| 124.0               | 124.0               | 0.0                 | ±0.1                  |
| 123.0               | 123.0               | 0.0                 | ±0.1                  |
| 122.0               | 122.0               | 0.0                 | ±0.1                  |
| 121.0               | 121.0               | 0.0                 | ±0.1                  |
| 120.0               | 120.0               | 0.0                 | ±0.1                  |
| 119.0               | 119.0               | 0.0                 | ±0.1                  |
| 118.0               | 118.0               | 0.0                 | ±0.1                  |
| 117.0               | 117.0               | 0.0                 | ±0.1                  |
| 116.0               | 116.0               | 0.0                 | ±0.1                  |
| 115.0               | 115.0               | 0.0                 | ±0.1                  |
| 114.0               | 114.0               | 0.0                 | ±0.1                  |
| 113.0               | 113.0               | 0.0                 | ±0.1                  |
| 112.0               | 112.0               | 0.0                 | ±0.1                  |
| 111.0               | 111.0               | 0.0                 | ±0.1                  |
| 110.0               | 110.0               | 0.0                 | ±0.1                  |
| 109.0               | 109.0               | 0.0                 | ±0.1                  |
| 108.0               | 108.0               | 0.0                 | ±0.1                  |
| 107.0               | 107.0               | 0.0                 | ±0.1                  |
| 106.0               | 106.0               | 0.0                 | ±0.1                  |
| 105.0               | 105.0               | 0.0                 | ±0.1                  |
| 104.0               | 104.0               | 0.0                 | ±0.1                  |
| 103.0               | 103.0               | 0.0                 | ±0.1                  |
| 102.0               | 102.0               | 0.0                 | ±0.1                  |
| 101.0               | 101.0               | 0.0                 | ±0.1                  |
| 100.0               | 100.0               | 0.0                 | ±0.1                  |
| 99.0                | 99.0                | 0.0                 | ±0.1                  |
| 98.0                | 98.0                | 0.0                 | ±0.1                  |
| 97.0                | 97.0                | 0.0                 | ±0.1                  |
| 96.0                | 96.0                | 0.0                 | ±0.1                  |
| 95.0                | 95.0                | 0.0                 | ±0.1                  |
| 94.0                | 94.0                | 0.0                 | ±0.1                  |
| 93.0                | 93.0                | 0.0                 | ±0.1                  |
| 92.0                | 92.0                | 0.0                 | ±0.1                  |
| 91.0                | 91.0                | 0.0                 | ±0.1                  |
| 90.0                | 90.0                | 0.0                 | ±0.1                  |
| 89.0                | 89.0                | 0.0                 | ±0.1                  |
| 88.0                | 88.0                | 0.0                 | ±0.1                  |
| 87.0                | 87.0                | 0.0                 | ±0.1                  |
| 86.0                | 86.0                | 0.0                 | ±0.1                  |
| 85.0                | 85.0                | 0.0                 | ±0.1                  |
| 84.0                | 84.0                | 0.0                 | ±0.1                  |
| 83.0                | 83.0                | 0.0                 | ±0.1                  |
| 82.0                | 82.0                | 0.0                 | ±0.1                  |
| 81.0                | 81.0                | 0.0                 | ±0.1                  |
| 80.0                | 80.0                | 0.0                 | ±0.1                  |
| 79.0                | 79.0                | 0.0                 | ±0.1                  |
| 78.0                | 78.0                | 0.0                 | ±0.1                  |
| 77.0                | 77.0                | 0.0                 | ±0.1                  |
| 76.0                | 76.0                | 0.0                 | ±0.1                  |
| 75.0                | 75.0                | 0.0                 | ±0.1                  |
| 74.0                | 74.0                | 0.0                 | ±0.1                  |
| 73.0                | 73.0                | 0.0                 | ±0.1                  |
| 72.0                | 72.0                | 0.0                 | ±0.1                  |
| 71.0                | 71.0                | 0.0                 | ±0.1                  |
| 70.0                | 70.0                | 0.0                 | ±0.1                  |
| 69.0                | 69.0                | 0.0                 | ±0.1                  |
| 68.0                | 68.0                | 0.0                 | ±0.1                  |
| 67.0                | 67.0                | 0.0                 | ±0.1                  |
| 66.0                | 66.0                | 0.0                 | ±0.1                  |
| 65.0                | 65.0                | 0.0                 | ±0.1                  |
| 64.0                | 64.0                | 0.0                 | ±0.1                  |
| 63.0                | 63.0                | 0.0                 | ±0.1                  |
| 62.0                | 62.0                | 0.0                 | ±0.1                  |
| 61.0                | 61.0                | 0.0                 | ±0.1                  |
| 60.0                | 60.0                | 0.0                 | ±0.1                  |
| 59.0                | 59.0                | 0.0                 | ±0.1                  |
| 58.0                | 58.0                | 0.0                 | ±0.1                  |
| 57.0                | 57.0                | 0.0                 | ±0.1                  |
| 56.0                | 56.0                | 0.0                 | ±0.1                  |
| 55.0                | 55.0                | 0.0                 | ±0.1                  |
| 54.0                | 54.0                | 0.0                 | ±0.1                  |
| 53.0                | 53.0                | 0.0                 | ±0.1                  |
| 52.0                | 52.0                | 0.0                 | ±0.1                  |
| 51.0                | 51.0                | 0.0                 | ±0.1                  |
| 50.0                | 50.0                | 0.0                 | ±0.1                  |
| 49.0                | 49.0                | 0.0                 | ±0.1                  |
| 48.0                | 48.0                | 0.0                 | ±0.1                  |
| 47.0                | 47.0                | 0.0                 | ±0.1                  |
| 46.0                | 46.0                | 0.0                 | ±0.1                  |
| 45.0                | 45.0                | 0.0                 | ±0.1                  |
| 44.0                | 44.0                | 0.0                 | ±0.1                  |
| 43.0                | 43.0                | 0.0                 | ±0.1                  |
| 42.0                | 42.0                | 0.0                 | ±0.1                  |
| 41.0                | 41.0                | 0.0                 | ±0.1                  |
| 40.0                | 40.0                | 0.0                 | ±0.1                  |
| 39.0                | 39.0                | 0.0                 | ±0.1                  |
| 38.0                | 38.0                | 0.0                 | ±0.1                  |
| 37.0                | 37.0                | 0.0                 | ±0.1                  |
| 36.0                | 36.0                | 0.0                 | ±0.1                  |
| 35.0                | 35.0                | 0.0                 | ±0.1                  |
| 34.0                | 34.0                | 0.0                 | ±0.1                  |
| 33.0                | 33.0                | 0.0                 | ±0.1                  |
| 32.0                | 32.0                | 0.0                 | ±0.1                  |
| 31.0                | 31.0                | 0.0                 | ±0.1                  |
| 30.0                | 30.0                | 0.0                 | ±0.1                  |
| 29.0                | 29.0                | 0.0                 | ±0.1                  |
| 28.0                | 28.0                | 0.0                 | ±0.1                  |
| 27.0                | 27.0                | 0.0                 | ±0.1                  |
| 26.0                | 26.0                | 0.0                 | ±0.1                  |
| 25.0                | 25.0                | 0.0                 | ±0.1                  |
| 24.0                | 24.0                | 0.0                 | ±0.1                  |
| 23.0                | 23.0                | 0.0                 | ±0.1                  |
| 22.0                | 22.0                | 0.0                 | ±0.1                  |
| 21.0                | 21.0                | 0.0                 | ±0.1                  |
| 20.0                | 20.0                | 0.0                 | ±0.1                  |
| 19.0                | 19.0                | 0.0                 | ±0.1                  |
| 18.0                | 18.0                | 0.0                 | ±0.1                  |
| 17.0                | 17.0                | 0.0                 | ±0.1                  |
| 16.0                | 16.0                | 0.0                 | ±0.1                  |
| 15.0                | 15.0                | 0.0                 | ±0.1                  |
| 14.0                | 14.0                | 0.0                 | ±0.1                  |
| 13.0                | 13.0                | 0.0                 | ±0.1                  |
| 12.0                | 12.0                | 0.0                 | ±0.1                  |
| 11.0                | 11.0                | 0.0                 | ±0.1                  |
| 10.0                | 10.0                | 0.0                 | ±0.1                  |
| 9.0                 | 9.0                 | 0.0                 | ±0.1                  |
| 8.0                 | 8.0                 | 0.0                 | ±0.1                  |
| 7.0                 | 7.0                 | 0.0                 | ±0.1                  |
| 6.0                 | 6.0                 | 0.0                 | ±0.1                  |
| 5.0                 | 5.0                 | 0.0                 | ±0.1                  |
| 4.0                 | 4.0                 | 0.0                 | ±0.1                  |
| 3.0                 | 3.0                 | 0.0                 | ±0.1                  |
| 2.0                 | 2.0                 | 0.0                 | ±0.1                  |
| 1.0                 | 1.0                 | 0.0                 | ±0.1                  |
| 0.0                 | 0.0                 | 0.0                 | ±0.1                  |
| -1.0                | -1.0                | 0.0                 | ±0.1                  |
| -2.0                | -2.0                | 0.0                 | ±0.1                  |
| -3.0                | -3.0                | 0.0                 | ±0.1                  |
| -4.0                | -4.0                | 0.0                 | ±0.1                  |
| -5.0                | -5.0                | 0.0                 | ±0.1                  |
| -6.0                | -6.0                | 0.0                 | ±0.1                  |
| -7.0                | -7.0                | 0.0                 | ±0.1                  |
| -8.0                | -8.0                | 0.0                 | ±0.1                  |
| -9.0                | -9.0                | 0.0                 | ±0.1                  |
| -10.0               | -10.0               | 0.0                 | ±0.1                  |
| -11.0               | -11.0               | 0.0                 | ±0.1                  |
| -12.0               | -12.0               | 0.0                 | ±0.1                  |
| -13.0               | -13.0               | 0.0                 | ±0.1                  |
| -14.0               | -14.0               | 0.0                 | ±0.1                  |
| -15.0               | -15.0               | 0.0                 | ±0.1                  |
| -16.0               | -16.0               | 0.0                 | ±0.1                  |
| -17.0               | -17.0               | 0.0                 | ±0.1                  |
| -18.0               | -18.0               | 0.0                 | ±0.1                  |
| -19.0               | -19.0               | 0.0                 | ±0.1                  |
| -20.0               | -20.0               | 0.0                 | ±0.1                  |
| -21.0               | -21.0               | 0.0                 | ±0.1                  |
| -22.0               | -22.0               | 0.0                 | ±0.1                  |
| -23.0               | -23.0               | 0.0                 | ±0.1                  |
| -24.0               | -24.0               | 0.0                 | ±0.1                  |
| -25.0               | -25.0               | 0.0                 | ±0.1                  |
| -26.0               | -26.0               | 0.0                 | ±0.1                  |
| -27.0               | -27.0               | 0.0                 | ±0.1                  |
| -28.0               | -28.0               | 0.0                 | ±0.1                  |
| -29.0               | -29.0               | 0.0                 | ±0.1                  |
| -30.0               | -30.0               | 0.0                 | ±0.1                  |
| -31.0               | -31.0               | 0.0                 | ±0.1                  |
| -32.0               | -32.0               | 0.0                 | ±0.1                  |
| -33.0               | -33.0               | 0.0                 | ±0.1                  |
| -34.0               | -34.0               | 0.0                 | ±0.1                  |
| -35.0               | -35.0               | 0.0                 | ±0.1                  |
| -36.0               | -36.0               | 0.0                 | ±0.1                  |
| -37.0               | -37.0               | 0.                  |                       |





# 11. Overall Indication

| Measured value (dB) | Deviation | Acceptance |
|---------------------|-----------|------------|
| Frequency           | ±0.1      | ±0.1       |
| Weighting           | ±0.1      | ±0.1       |

# 12. High level stability

| Frequency | S/N (dB) | S/N (dB) | Deviation | Acceptance |
|-----------|----------|----------|-----------|------------|
| 1000      | 120.0    | 120.0    | 0.0       | ±0.2       |

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2  
or by value k=2.55, depending on the level of confidence of approximately 95 %

End of Calibration Certificate

Request No. 21-07-0221

MTC No. 111-1P-1701047

## CALIBRATION CERTIFICATE

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.  
Address: 104 Phrasaraksa Rd., Khlong Phrasaraksa, Khlong Phrasaraksa, Bangkok 10140  
Calibrated at: 104 Phrasaraksa Rd., Khlong Phrasaraksa, Khlong Phrasaraksa, Bangkok 10140  
Instrument Calibrated: Sound Level Meter  
Manufacturer: Brüel & Kjær  
Model: 8010  
Serial No: 00240514-010 (BKC, 150971)  
Purchase No: 100-001-02-100-001  
Purchase Date: 10/10/2021  
Standard used: 1. ISO 9001:2015  
2. ISO 14001:2015  
3. ISO 45001:2018  
4. ISO 9001:2015  
5. ISO 14001:2015  
6. ISO 45001:2018  
7. ISO 9001:2015  
8. ISO 14001:2015  
9. ISO 45001:2018

Date of Receipt: 24 Jan 2024  
Date of Calibration: 22 Jan 2024

Request No. 21-07-0221

MTC No. 111-1P-1701047

1. Power Amplifier (B&K) 2700 S/N 151750  
2. Spectral Analyzer (B&K) 8010 S/N 151750  
3. Digital Multimeter Agilent 34461A S/N 54401550  
4. Programmable Attenuator TPA 100A S/N 212

## Calibration Procedure

This instrument was calibrated by using calibration procedures on CP-102-02 and CP-102-03 which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3. These calibration procedures were related to the electrical and acoustic signal levels. The electrical signal level was carried out with the direct measurement method. The acoustic signal level was carried out with the comparison method.

The instrument has been calibrated against standards maintained at the National Institute of Standards and Technology (NIST) which are traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST).

The information on actual reading is included below and the uncertainty is also quoted to the measured values.

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%.

Date of Calibration: 22 Jan 2024

Page

1. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.  
2. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.  
3. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.  
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9. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.  
10. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.

Request No. 21-07-0221

MTC No. 111-1P-1701047

| Frequency | Measured value (dB) | Deviation | Acceptance |
|-----------|---------------------|-----------|------------|
| 1000      | 120.0               | 0.0       | ±0.2       |

Note: The external calibration was adjusted to be fully performed. The external calibration adjustment was then completed at the display of 120.0 dB.

## 2. Self-generated noise

| Frequency | Measured value (dB) | Deviation | Acceptance |
|-----------|---------------------|-----------|------------|
| 1000      | 120.0               | 0.0       | ±0.2       |

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

| Frequency | Measured value (dB) | Deviation | Acceptance |
|-----------|---------------------|-----------|------------|
| 1000      | 120.0               | 0.0       | ±0.2       |

Date of Calibration: 22 Jan 2024

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1. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.  
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9. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.  
10. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.

## 3. Level linearity on the reference level range

| Frequency | Measured value (dB) | Deviation | Acceptance |
|-----------|---------------------|-----------|------------|
| 1000      | 120.0               | 0.0       | ±0.2       |

Date of Calibration: 22 Jan 2024

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1. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.  
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Request No. 21-07-0221

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## 3. Acoustical signal level of frequency weightings

| Frequency | Measured value (dB) | Deviation | Acceptance |
|-----------|---------------------|-----------|------------|
| 1000      | 120.0               | 0.0       | ±0.2       |

## 4. Electrical signal level of frequency weightings

| Frequency | Measured value (dB) | Deviation | Acceptance |
|-----------|---------------------|-----------|------------|
| 1000      | 120.0               | 0.0       | ±0.2       |

Date of Calibration: 22 Jan 2024

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10. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.

## 5. Level linearity on the reference level range

| Frequency | Measured value (dB) | Deviation | Acceptance |
|-----------|---------------------|-----------|------------|
| 1000      | 120.0               | 0.0       | ±0.2       |

## 6. Level linearity including the level range control

| Frequency | Measured value (dB) | Deviation | Acceptance |
|-----------|---------------------|-----------|------------|
| 1000      | 120.0               | 0.0       | ±0.2       |

Date of Calibration: 22 Jan 2024

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1. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.  
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10. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.

Request No. 21-07-0221

MTC No. 111-1P-1701047

## 5. Long-term stability

| Frequency | Measured value (dB) | Deviation | Acceptance |
|-----------|---------------------|-----------|------------|
| 1000      | 120.0               | 0.0       | ±0.2       |

## 6. Frequency and time weightings at 1 kHz

| Frequency | Measured value (dB) | Deviation | Acceptance |
|-----------|---------------------|-----------|------------|
| 1000      | 120.0               | 0.0       | ±0.2       |

## 6.2 Time weightings at 1 kHz

| Frequency | Measured value (dB) | Deviation | Acceptance |
|-----------|---------------------|-----------|------------|
| 1000      | 120.0               | 0.0       | ±0.2       |

Date of Calibration: 22 Jan 2024

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1. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.  
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9. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.  
10. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.

## 7. Time burst response

| Frequency | Measured value (dB) | Deviation | Acceptance |
|-----------|---------------------|-----------|------------|
| 1000      | 120.0               | 0.0       | ±0.2       |

Date of Calibration: 22 Jan 2024

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1. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.  
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9. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.  
10. Name of the customer: ALS Laboratory Group (Thailand) Co., Ltd.

### 10. Peak level stability

| Measured value (dB) | Deviation (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|---------------------|----------------|-----------------------|------------------|------------------------------------|
| Complete cycle      | 125.0          | 0.1                   | 0.1              | 0.35                               |
| Positive half cycle | 124.0          | 0.2                   | 0.2              | 0.35                               |
| Negative half cycle | 124.0          | 0.2                   | 0.2              | 0.35                               |

### 11. Overall indication

| Measured value (dB) | Deviation (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|---------------------|----------------|-----------------------|------------------|------------------------------------|
| Complete cycle      | 125.0          | 0.1                   | 0.1              | 0.35                               |

### 12. High level stability

| Time  | Measured value (dB) | Deviation (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|-------|---------------------|----------------|-----------------------|------------------|------------------------------------|
| Begin | 125.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| End   | 125.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |

Calibrated by:   
(Mr. Parnat Parnas)

Approved by: 

Electrical and Electronic Standards Laboratory  
Industrial Metrology and Testing Service Centre  
Ref: 70112107100149506

Date of Calibration: 22 Feb 2024  
Date of Issue: 29 Feb 2024


End of Certificate

## CALIBRATION CERTIFICATE

Calibrated by: A15 Laboratory Group (Thailand) Co., Ltd.  
Address: 614 Phrasaraksa Rd., Phrasaraksa, Klong Luang District, Pathum Thani 12120  
Calibrated at: Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre  
Set 11, Bangue Industrial Estate, Set 11, Rd. A, Muang Samut Prakan, 10240

**Instrument Calibration**  
Description: Sound Level Meter  
Manufacturer: Rion  
Model: 92-42  
Serial No.: 0067280 (ID: 808, 716280)  
Accessories: IEC 6167-2 (ID: 808, 716280)  
Principle: IEC 6167-2 (ID: 808, 716280)

**Ambient Environment**  
Temperature: (23 ± 1) °C  
Relative Humidity: No > 15 %  
Airborne Pressure: (101.325 ± 1) kPa



1. IEC 6167-2 (ID: 808, 716280)
2. Condenser Microphone Brüel&Kjær 4189 S 28A941
3. Decade Attenuator And. A1 20 - 5N 046462
4. Lutron Arctonix Waveform Generator Agilent 22320A 5N MY443666
5. Digital Function Synthesizer NI Electronic Instruments DI 193A 5N 122017
6. Digital Multimeter Fluke 8520A 5N 4085007
7. Isocompare Rion 72 5N 6002446
8. Measurement Noise Brüel&Kjær 2416 5N 1537434

Date of Receipt: 24 Feb 2024  
Date of Calibration: 22 Feb 2024

### Calibration Procedure

This instrument was calibrated by using calibration procedures on CP 102-02 and CP 102-03 which were based on IEC 6167-2 (ID: 808, 716280) and Sound Level Meter Part 3: Periodic test (2013). These calibration procedures were related to the electrical and acoustic signal level. The electrical signal level was carried out with the direct measurement method. The acoustic signal level was performed as an indirect process with the comparison measurement method.

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

The information on actual reading is available in the certificate and the uncertainty limits quoted refer to the measured values only.  
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%.

Date of Calibration: 22 Feb 2024

### 1. Absolute Sensitivity

| Reference Source | Measured value (dB) | Deviation (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|------------------|---------------------|----------------|-----------------------|------------------|------------------------------------|
| Signal level     | 113.9               | 0.1            | 0.1                   | 0.10             | 0.1                                |

Note: The corrected calibration adjustment was directly performed. The internal calibration adjustment was then completed at the display of 113.9 dB.

### 2. Self-generated noise

#### 2.1 Normal use

| Measured value (dB) | Deviation (dB) | Maximum permitted uncertainty of measurement (dB) |
|---------------------|----------------|---|
| 26.2                | 0.1            | 0.1   |

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

| Frequency Weighting | Measured value (dB) | Deviation (dB) | Maximum permitted uncertainty of measurement (dB) |
|---------------------|---------------------|----------------|---|
| A-weight            | 12.0                | 0.1            | 0.1   |
| C-weight            | 17.0                | 0.1            | 0.1   |
| Flat                | 27.5                | 0.1            | 0.1   |

Date of Calibration: 22 Feb 2024

Date of Calibration: 22 Feb 2024

Date of Calibration: 22 Feb 2024

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

| Reference value (dB) | Measured value (dB) | Deviation (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|----------------------|---------------------|----------------|-----------------------|------------------|------------------------------------|
| 117                  | 117.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 126                  | 126.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 135                  | 135.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 134                  | 134.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 125                  | 125.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 124                  | 124.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 118                  | 118.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 114                  | 114.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 109                  | 109.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 104                  | 104.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 99                   | 99.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 94                   | 94.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 89                   | 89.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 84                   | 84.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 79                   | 79.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 74                   | 74.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 69                   | 69.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 64                   | 64.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |

### 7.1 Level linearity on the reference level range (cont.)

| Reference value (dB) | Measured value (dB) | Deviation (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|----------------------|---------------------|----------------|-----------------------|------------------|------------------------------------|
| 59                   | 59.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 54                   | 54.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 49                   | 49.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 44                   | 44.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 39                   | 39.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 34                   | 34.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 29                   | 29.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 24                   | 24.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 19                   | 19.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 14                   | 14.0                | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 9                    | 9.0                 | 0.1            | 0.1                   | 0.10             | 0.1                                |

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

| Range  | Measured value (dB) | Deviation (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|--------|---------------------|----------------|-----------------------|------------------|------------------------------------|
| 10-130 | 125.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |

### 8.1 Level linearity including the level range control

| Range  | Measured value (dB) | Deviation (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|--------|---------------------|----------------|-----------------------|------------------|------------------------------------|
| 10-130 | 125.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |

### 9. Tone burst response

| Frequency | Duration | Measured value (dB) | Deviation (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|-----------|----------|---------------------|----------------|-----------------------|------------------|------------------------------------|
| 100       | 100      | 125.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 100       | 100      | 125.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 100       | 100      | 125.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 100       | 100      | 125.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 100       | 100      | 125.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 100       | 100      | 125.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 100       | 100      | 125.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 100       | 100      | 125.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 100       | 100      | 125.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |
| 100       | 100      | 125.0               | 0.1            | 0.1                   | 0.10             | 0.1                                |

Date of Calibration: 22 Feb 2024

Date of Calibration: 22 Feb 2024

Date of Calibration: 22 Feb 2024





# SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

81/41/15 Moo 10, Bang Phay, Bang Phay, Bangkok 10710 THAILAND  
Tel: 02-6546 111 Fax: 02-6546 110 Email: sithiporn@thaisithiporn.com Web: www.sithiporn.com



## SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

### Continuation of Calibration Certificate

Cert. No.: ACL23309  
Job No.: VY06AC0001  
Page: 2 of 8

Calibration Procedure: CIPAC-01

#### Calibration Method:

This equipment was calibrated by using an IEC-61373-2 (2011) Standard for the event level meter (SLM).  
The SLM test results for Acoustical and Electrical signal level of frequency weighting with A-weight, C-weight and Reference Standard Instruments.

For test results of each item were made by observation of each instrument display and test with SLM display.

#### Condition of the result of calibration:

| Instrument             | Model    | Serial No. | Exp. No.       | Exp. Date |
|------------------------|----------|------------|----------------|-----------|
| Maximum Oscilloscope   | 33210A   | MY40017076 | 12-000-23      | 07-01-24  |
| Maximum Oscilloscope   | 33511B   | MY3202742  | 12-000-23      | 07-01-24  |
| Digital Multimeter     | 33461A   | MY3322064  | 12-100-20-0204 | 13-01-24  |
| Digital Multimeter     | 33461A   | MY3322064  | 12-100-20-0204 | 13-01-24  |
| Programmable Acoustics | NAI-1070 | 62160214   | 12-100-23      | 07-01-24  |
| Conducting Microphone  | 297700   | AD-001-23  | 12-100-24      | 07-01-24  |
| Measuring Amplifier    | NA-428AF | 3456095    | 12-100-23      | 14-01-24  |

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

1. National Institute of Metrology (Thailand).
2. Thailand Institute of Scientific and Technological Research (TISTR).

### Calibration Certificate

Equipment: FOUND LEVEL METER  
Manufacturer: RION  
Model: 30-42 Maximum QC 52 / Principle No. 241.24  
Serial No.: 9050493 / 13771 / 4254  
ID No.: 000017076

Condition As Found: GOOD

Customer: AEC LABORATORY GROUP (THAILAND) LTD.,  
104 PHATHANAKANAL PHATHANAKANAL ROAD,  
BANGKANG PHATHANAKANAL KHEO SIAM LUNGA,  
BANGKOK 10250 THAILAND

Location: -  
Ambient Temperature: 23.0 ± 0.3 °C  
Relative Humidity: 40.0 ± 0.3 %

Received Date: 22 SEPTEMBER 2023  
Calibration Date: 16-18 OCTOBER 2023  
Date of Issue: 19 OCTOBER 2023

Calibrated by: Nitikul Pongpan

Approved by: T. Pongpan  
(Thaisithiporn)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, and is not to be reproduced  
or used for any other purpose without the prior approval of the head of Calibration Laboratory.

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T. Pongpan

## SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

### Continuation of Calibration Certificate

Cert. No.: ACL23309  
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#### Summary of Measurement Results:

| Parameter   | Pass | Fail | Uncertainty | Maximum permitted uncertainty of measurement (dB) |
|---|------|------|-------------|---|
| 1. Absolute sensitivity                             | ✓    | -    | 0.2         | N/A   |
| 2. Self-generated noise                             | ✓    | -    | 0.2         | N/A   |
| 3. Acoustical signal level of frequency weighting   | ✓    | -    | 0.3         | 0.6   |
| 125 Hz  | ✓    | -    | 0.3         | 0.5   |
| 1000 Hz   | ✓    | -    | 0.3         | 0.7   |
| 8000 Hz   | ✓    | -    | 0.3         | 0.7   |
| 4. Electrical signal level of frequency weighting   | ✓    | -    | 0.3         | 0.6   |
| For 10 Hz to 4 kHz                                  | ✓    | -    | 0.2         | 0.7   |
| For 4 kHz to 10 kHz                                 | ✓    | -    | 0.2         | 0.7   |
| For 10 kHz to 20 kHz                                | ✓    | -    | 0.2         | 0.7   |
| 5. Frequency and time weighting at 1 kHz            | ✓    | -    | 0.1         | 0.1   |
| 6. Long-term stability                              | ✓    | -    | 0.2         | 0.3   |
| 7. Level accuracy on the reference level range      | ✓    | -    | 0.2         | 0.3   |
| 8. Level accuracy including the level range control | ✓    | -    | 0.2         | 0.3   |
| 9. Time base response                               | ✓    | -    | 0.2         | 0.3   |
| 10. Peak C-weight level                             | ✓    | -    | 0.2         | 0.3   |
| 11. Overload indication                             | ✓    | -    | 0.2         | 0.3   |
| 12. High level stability                            | ✓    | -    | 0.1         | 0.1   |

Note: Pass/Fail evaluation for each parameter will be considered together from the acceptance limit and the Maximum permitted uncertainty of measurement.

## SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

### Continuation of Calibration Certificate

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#### 4. Electrical signal level of frequency weighting

| Frequency (Hz) | Flat | C-weight | A-weight | Acceptance Limit (dB) |
|----------------|------|----------|----------|-----------------------|
| 63             | 0.0  | -0.1     | 0.0      | +2.0                  |
| 125            | 0.0  | 0.0      | 0.0      | +1.7                  |
| 250            | 0.0  | 0.0      | -0.1     | +1.5                  |
| 500            | 0.0  | 0.0      | 0.0      | +1.3                  |
| 1000           | 0.0  | 0.0      | 0.0      | +1.0                  |
| 2000           | 0.0  | 0.0      | 0.0      | +1.0                  |
| 4000           | 0.0  | 0.0      | 0.0      | +1.0                  |
| 8000           | 0.0  | 0.1      | 0.1      | +1.0                  |

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

| Frequency Weighting | Accepted Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|---------------------|---------------------|---------------------|----------------------|-----------------------|
| A-weight            | 94.0                | 94.0                | 0.0                  | +0.2                  |
| C-weight            | 94.0                | 94.0                | 0.0                  | +0.2                  |
| Flat                | 94.0                | 94.0                | 0.0                  | +0.2                  |

#### 5.2 Time weighting at 1 kHz

| Frequency Weighting | Accepted Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|---------------------|---------------------|---------------------|----------------------|-----------------------|
| Fast                | 94.0                | 94.0                | 0.0                  | +0.1                  |
| Slow                | 94.0                | 94.0                | 0.0                  | +0.1                  |
| Log                 | 94.0                | 94.0                | 0.0                  | +0.1                  |

#### 6. Long-term stability

| Frequency Weighting | SLM Display at initial (dB) | SLM Display at final (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|---------------------|-----------------------------|---------------------------|----------------------|-----------------------|
| A-weight            | 94.0                        | 94.0                      | 0.0                  | +0.1                  |

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## SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

### Continuation of Calibration Certificate

Cert. No.: ACL23309  
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#### Result of calibration:

| Acoustic Amplitude Signal (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|--------------------------------|---------------------|----------------------|-----------------------|
| 93.0 (93.0)                    | 93.0                | 0.0                  | +0.2                  |

#### 2. Self-generated noise

| Measured value (dB) |
|---------------------|
| 76.5                |

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

| Frequency weighting | Measured value (dB) |
|---------------------|---------------------|
| A-weight            | 12.6                |
| C-weight            | 16.8                |
| Flat                | 24.5                |

#### 3. Acoustical signal level of frequency weighting

| Frequency (Hz) | Deviation from nominal frequency weighting, response curve (dB) | Accepted Limit (dB) |
|----------------|---|---------------------|
| 125            | 0.3   | +1.5                |
| 1000           | 0.0   | +1.0                |
| 8000           | -0.3  | +1.0                |

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### Continuation of Calibration Certificate

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#### 11. Overload indication

| Measured value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|---------------------|----------------------|-----------------------|
| Positive half cycle | 0.0                  | +1.5                  |
| Negative half cycle | 0.0                  | +1.5                  |

#### 12. High level stability

| Frequency Weighting | SLM Display at initial (dB) | SLM Display at final (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|---------------------|-----------------------------|---------------------------|----------------------|-----------------------|
| A-weight            | 117.0                       | 117.0                     | 0.0                  | +0.1                  |

The reported result is based on a standard uncertainty calculated by using GUM, Type A or any value following GUM, or given as a level of confidence of approximately 95%.

End of Calibration Certificate

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## SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

### Continuation of Calibration Certificate

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

| Accepted Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|---------------------|---------------------|----------------------|-----------------------|
| 127.0               | 127.0               | 0.0                  | +1.1                  |
| 130.0               | 130.0               | 0.0                  | +1.1                  |
| 133.0               | 133.0               | 0.0                  | +1.1                  |
| 136.0               | 136.0               | 0.0                  | +1.1                  |
| 139.0               | 139.0               | 0.0                  | +1.1                  |
| 142.0               | 142.0               | 0.0                  | +1.1                  |
| 145.0               | 145.0               | 0.0                  | +1.1                  |
| 148.0               | 148.0               | 0.0                  | +1.1                  |
| 151.0               | 151.0               | 0.0                  | +1.1                  |
| 154.0               | 154.0               | 0.0                  | +1.1                  |
| 157.0               | 157.0               | 0.0                  | +1.1                  |
| 160.0               | 160.0               | 0.0                  | +1.1                  |
| 163.0               | 163.0               | 0.0                  | +1.1                  |
| 166.0               | 166.0               | 0.0                  | +1.1                  |
| 169.0               | 169.0               | 0.0                  | +1.1                  |
| 172.0               | 172.0               | 0.0                  | +1.1                  |
| 175.0               | 175.0               | 0.0                  | +1.1                  |
| 178.0               | 178.0               | 0.0                  | +1.1                  |
| 181.0               | 181.0               | 0.0                  | +1.1                  |
| 184.0               | 184.0               | 0.0                  | +1.1                  |
| 187.0               | 187.0               | 0.0                  | +1.1                  |
| 190.0               | 190.0               | 0.0                  | +1.1                  |
| 193.0               | 193.0               | 0.0                  | +1.1                  |
| 196.0               | 196.0               | 0.0                  | +1.1                  |
| 199.0               | 199.0               | 0.0                  | +1.1                  |
| 202.0               | 202.0               | 0.0                  | +1.1                  |
| 205.0               | 205.0               | 0.0                  | +1.1                  |
| 208.0               | 208.0               | 0.0                  | +1.1                  |
| 211.0               | 211.0               | 0.0                  | +1.1                  |
| 214.0               | 214.0               | 0.0                  | +1.1                  |
| 217.0               | 217.0               | 0.0                  | +1.1                  |
| 220.0               | 220.0               | 0.0                  | +1.1                  |
| 223.0               | 223.0               | 0.0                  | +1.1                  |

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## SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

### Continuation of Calibration Certificate

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

| Range | Accepted Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|-------|---------------------|---------------------|----------------------|-----------------------|
| Flat  | 94.0                | 94.0                | 0.0                  | +0.1                  |

#### 9. Time base response

| Time      | Time base deviation, T0 (ms) | Cycle | Accepted Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|-----------|------------------------------|-------|---------------------|---------------------|----------------------|-----------------------|
| Weighting | 0.25                         | 1     | 108.0               | 107.9               | -0.1                 | 15.5, -0.5            |
| Fast      | 2                            | 8     | 117.0               | 117.0               | 0.0                  | 10.0, -2.5            |
|           | 200                          | 800   | 134.0               | 134.0               | 0.0                  | +1.0                  |
|           | 2                            | 8     | 108.0               | 108.0               | 0.0                  | 15.5, -0.5            |
| Slow      | 200                          | 800   | 127.4               | 127.4               | 0.0                  | +1.0                  |
|           | 0.25                         | 1     | 99.0                | 98.9                | -0.1                 | 15.5, -0.5            |
|           | 2                            | 8     | 108.0               | 108.0               | 0.0                  | 10.0, -2.5            |
| SLI       | 200                          | 800   | 128.0               | 128.0               | 0.0                  | +1.0                  |

#### 10. Peak C-weight level

| Number of cycle in test signal | Accepted Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|--------------------------------|---------------------|---------------------|----------------------|-----------------------|
| Continuous                     | 113.0               | 113.1               | 0.1                  | +0.1                  |
| 1 sec                          | 114.4               | 114.2               | -0.2                 | +0.1                  |

| Number of cycle in test signal | Accepted Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|--------------------------------|---------------------|---------------------|----------------------|-----------------------|
| Continuous                     | 113.0               | 113.1               | 0.1                  | +0.1                  |
| Positive half cycle            | 115.4               | 115.3               | -0.1                 | +0.1                  |
| Negative half cycle            | 115.4               | 115.3               | -0.1                 | +0.1                  |

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## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : ROPS  
Model : NL-42 - Microphone UC 52 - Preamp for NH 24  
Serial No.: 0283825 (7043) / 72849  
ID No.: BCK 170413

Condition As Found : (NONE)

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
(66) PHATHANAKAN 46, PHATHANAKAN ROAD  
KIWAENG PHATHANAKAN KHE, SLANG LUANG  
BANGKOK, 10250 THAILAND

Location :  
Ambient Temperature : (23.0 ± 2.0) °C  
Pressure : (1013.2 ± 0.1) hPa  
Relative Humidity : (50.0 ± 2.0) %

Received Date : 11 JANUARY 2024  
Calibration Date : 22-24 JANUARY 2024  
Date of Issue : 24 JANUARY 2024

Calibrated by : Natchanon Pongpradit

Approved by : T. Petch

(Thakorn Petch)

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



Calibration Procedure : CIP-AC-01

## Calibration Method :

The equipment was calibrated by follow on IEC 61672-1 (2013) standard for sound level meter (SLM).  
The SLM had been to Acoustical and Electrical signal test of frequency weighting, time, A-weight, and Reference  
Standard frequencies.

For more details of each item, please refer to the details of each instrument display and also with N/A's display.

## Condition of this result of calibration :

## 1. Reference Standard Instruments :

| Instrument              | Model    | Serial No. | Cert. No.    | Exp. Date |
|-------------------------|----------|------------|--------------|-----------|
| Waveform Generator      | 33216A   | MY9017678  | IEC 60060-21 | 27-01-24  |
| Waveform Generator      | 33011B   | MY5240742  | IEC 60060-21 | 01-02-24  |
| Digital Multimeter      | 34461A   | MY5322004  | IEC 60398-1  | 19-02-24  |
| Digital Multimeter      | 34461A   | MY5322006  | IEC 60398-1  | 19-02-24  |
| Digital Multimeter      | 4440A    | MY6005473  | IEC 60398-1  | 14-02-24  |
| Programmable Attenuator | MA11010  | 6210014    | IEC 6001-21  | 08-03-24  |
| Condenser Microphone    | 4800     | 2977006    | AA 1000-21   | 14-03-24  |
| Manufacturing Amplifier | NA-420A2 | 3456095    | NA 1000-21   | 14-03-24  |

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

3. This certificate is acceptable to the international system of unit (SI) standard.

3.1. National Institute of Metrology (Thailand).

3.2. Thailand Institute of Scientific and Technological Research (TISTR).



## Result of calibration :

## 1. Absolute sensitivity

| Reference<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>(dB) | Acceptance<br>Limits<br>(dB) |
|----------------------------|---------------------------|-------------------|------------------------------|
| 95.0 (±0.5)                | 95.0                      | 0.0               | ±0.5                         |

## 2. Self-generated noise

| Measured Value<br>(dB) |
|------------------------|
| 15.1                   |

2.2. The measurement of the sound level meter was obtained by each sound signal device.

| Frequency<br>Weighting | Measured value<br>(dB) |
|------------------------|------------------------|
| A-weight               | 12.0                   |
| C-weight               | 10.5                   |
| Flat                   | 24.4                   |

## 3. Acoustical signal levels of frequency weightings

Note: five-field acoustic response at a level of 94 dB

| Frequency<br>(Hz) | F <sub>ref</sub> | F-weight | A-weight | Acceptance<br>Limits |
|-------------------|------------------|----------|----------|----------------------|
| 125               | 0.5              | 0.3      | 0.2      | ±0.5                 |
| 1000              | 0.0              | 0.0      | 0.0      | ±0.5                 |
| 8000              | 0.0              | 0.0      | 0.0      | ±0.5                 |

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## 4. Level linearity including the level range control

| Range | Assessed<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits |
|-------|---------------------------|---------------------------|----------------------------|----------------------|
| Ratio | 94.0                      | 94.0                      | 0.0                        | ±0.5                 |

## 5. Time based response

| Time<br>Weighting | Time<br>Interval, T <sub>1</sub><br>(sec) | Cycle | Assessed<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits |
|-------------------|---|-------|---------------------------|---------------------------|----------------------------|----------------------|
| Fast              | 2   | 8     | 117.0                     | 117.0                     | 0.0                        | ±0.5                 |
|                   | 200                                       | 800   | 114.0                     | 114.0                     | 0.0                        | ±0.5                 |
| Slow              | 2   | 8     | 108.0                     | 108.0                     | 0.0                        | ±0.5                 |
|                   | 200                                       | 800   | 127.0                     | 127.0                     | 0.0                        | ±0.5                 |
| SEL               | 2   | 8     | 99.0                      | 99.0                      | 0.0                        | ±0.5                 |
|                   | 200                                       | 800   | 128.0                     | 128.0                     | 0.0                        | ±0.5                 |

## 6. Peak &amp; sound level

| Number of cycle<br>in<br>one signal<br>Unit | Assessed<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits |
|---|---------------------------|---------------------------|----------------------------|----------------------|
| Continuous                                  | 127.0                     | 127.0                     | 0.0                        | ±0.5                 |
| Fast  | 126.4                     | 126.4                     | 0.0                        | ±0.5                 |

| Number of cycle<br>in<br>one signal<br>Unit | Assessed<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits |
|---|---------------------------|---------------------------|----------------------------|----------------------|
| Continuous                                  | 115.0                     | 115.0                     | 0.0                        | ±0.5                 |
| Fast  | 115.4                     | 115.4                     | 0.0                        | ±0.5                 |
| Negative half cycle                         | 115.4                     | 115.2                     | -0.2                       | ±0.5                 |

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## 4. Electrical signal levels of frequency weightings

Weighting network, response with reference to 1 kHz

| Frequency<br>(Hz) | F <sub>ref</sub> | C-weight | A-weight | Acceptance<br>Limits |
|-------------------|------------------|----------|----------|----------------------|
| 63                | 0.0              | 0.0      | 0.0      | ±0.5                 |
| 125               | 0.0              | 0.0      | 0.0      | ±0.5                 |
| 250               | 0.0              | 0.0      | 0.0      | ±0.5                 |
| 500               | 0.0              | 0.0      | 0.0      | ±0.5                 |
| 1000              | 0.0              | 0.0      | 0.0      | ±0.5                 |
| 2000              | 0.0              | 0.0      | 0.0      | ±0.5                 |
| 4000              | 0.0              | 0.0      | 0.0      | ±0.5                 |
| 8000              | 0.0              | 0.0      | 0.0      | ±0.5                 |

## 5. Frequency and time weightings at 1 kHz

| Frequency<br>Weighting | Assessed<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits |
|------------------------|---------------------------|---------------------------|----------------------------|----------------------|
| A-weight               | 94.0                      | 94.0                      | 0.0                        | ±0.5                 |
| C-weight               | 94.0                      | 94.0                      | 0.0                        | ±0.5                 |
| Flat                   | 94.0                      | 94.0                      | 0.0                        | ±0.5                 |

## 3.2 Time weighting at 1 kHz

| Frequency<br>Weighting | Assessed<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits |
|------------------------|---------------------------|---------------------------|----------------------------|----------------------|
| Fast                   | 94.0                      | 94.0                      | 0.0                        | ±0.5                 |
| Slow                   | 94.0                      | 94.0                      | 0.0                        | ±0.5                 |
| Flat                   | 94.0                      | 94.0                      | 0.0                        | ±0.5                 |

## 6. Long-term stability

| Frequency<br>Weighting | SLM Display<br>at Initial<br>Value<br>(dB) | SLM Display<br>at Final<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits |
|------------------------|--|--|----------------------------|----------------------|
| A-weight               | 94.0                                       | 94.0                                     | 0.0                        | ±0.5                 |

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## 11. Overhead indicator

| Measured value (dB)        | Deviation<br>Value<br>(dB) | Acceptance<br>Limits |
|----------------------------|----------------------------|----------------------|
| Positive<br>one-half cycle | -0.1                       | ±0.5                 |
| Negative<br>one-half cycle | -0.1                       | ±0.5                 |

## 12. High level stability

| Frequency<br>Weighting | SLM Display<br>at Initial<br>Value<br>(dB) | SLM Display<br>at Final<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits |
|------------------------|--|--|----------------------------|----------------------|
| A-weight               | 127.0                                      | 127.0                                    | 0.0                        | ±0.5                 |

The reported uncertainty is based on a standard uncertainty must stated by coverage factor k = 2

at any value following calculation, using a level of confidence of approximately 95 %

End of Calibration Certificate

T. Petch



## Summary of Measurement Result :

| Parameter  | Uncertainty<br>(dB) | Maximum-permitted<br>uncertainty (dB) |
|--|---------------------|---------------------------------------|
| 1. Absolute sensitivity                              | 0.2                 | N/A                                   |
| 2. Self-generated noise                              | 0.2                 | N/A                                   |
| 3. Acoustical signal levels of frequency weightings  |                     |                                       |
| 125 Hz   | 0.2                 | 0.6                                   |
| 1000 Hz  | 0.2                 | 0.6                                   |
| 8000 Hz  | 0.2                 | 0.6                                   |
| 4. Electrical signal levels of frequency weightings  |                     |                                       |
| For 1/3 Octave Filter                                | 0.2                 | 0.6                                   |
| For 1/1 Octave Filter                                | 0.2                 | 0.6                                   |
| For 1/2 Octave Filter                                | 0.2                 | 0.6                                   |
| 5. Frequency and time weightings at 1 kHz            |                     |                                       |
| A-weight   | 0.2                 | 0.6                                   |
| C-weight   | 0.2                 | 0.6                                   |
| Flat   | 0.2                 | 0.6                                   |
| 6. Long-term stability                               |                     |                                       |
| 1. Level linearity on the reference level range      | 0.2                 | 0.6                                   |
| 2. Level linearity including the level range control | 0.2                 | 0.6                                   |
| 3. Time-based response                               | 0.2                 | 0.6                                   |
| 4. Peak & sound level                                | 0.2                 | 0.6                                   |
| 5. Overhead indicator                                | 0.2                 | 0.6                                   |
| 6. High-level stability                              | 0.2                 | 0.6                                   |

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## 7. Level linearity on the reference level range

| Assessed<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits |
|---------------------------|---------------------------|----------------------------|----------------------|
| 117.0                     | 117.0                     | 0.0                        | ±0.5                 |
| 116.8                     | 116.8                     | 0.0                        | ±0.5                 |
| 116.6                     | 116.6                     | 0.0                        | ±0.5                 |
| 116.4                     | 116.4                     | 0.0                        | ±0.5                 |
| 116.2                     | 116.2                     | 0.0                        | ±0.5                 |
| 116.0                     | 116.0                     | 0.0                        | ±0.5                 |
| 115.8                     | 115.8                     | 0.0                        | ±0.5                 |
| 115.6                     | 115.6                     | 0.0                        | ±0.5                 |
| 115.4                     | 115.4                     | 0.0                        | ±0.5                 |
| 115.2                     | 115.2                     | 0.0                        | ±0.5                 |
| 115.0                     | 115.0                     | 0.0                        | ±0.5                 |
| 114.8                     | 114.8                     | 0.0                        | ±0.5                 |
| 114.6                     | 114.6                     | 0.0                        | ±0.5                 |
| 114.4                     | 114.4                     | 0.0                        | ±0.5                 |
| 114.2                     | 114.2                     | 0.0                        | ±0.5                 |
| 114.0                     | 114.0                     | 0.0                        | ±0.5                 |
| 113.8                     | 113.8                     | 0.0                        | ±0.5                 |
| 113.6                     | 113.6                     | 0.0                        | ±0.5                 |
| 113.4                     | 113.4                     | 0.0                        | ±0.5                 |
| 113.2                     | 113.2                     | 0.0                        | ±0.5                 |
| 113.0                     | 113.0                     | 0.0                        | ±0.5                 |
| 112.8                     | 112.8                     | 0.0                        | ±0.5                 |
| 112.6                     | 112.6                     | 0.0                        | ±0.5                 |
| 112.4                     | 112.4                     | 0.0                        | ±0.5                 |
| 112.2                     | 112.2                     | 0.0                        | ±0.5                 |
| 112.0                     | 112.0                     | 0.0                        | ±0.5                 |
| 111.8                     | 111.8                     | 0.0                        | ±0.5                 |
| 111.6                     | 111.6                     | 0.0                        | ±0.5                 |
| 111.4                     | 111.4                     | 0.0                        | ±0.5                 |
| 111.2                     | 111.2                     | 0.0                        | ±0.5                 |
| 111.0                     | 111.0                     | 0.0                        | ±0.5                 |
| 110.8                     | 110.8                     | 0.0                        | ±0.5                 |
| 110.6                     | 110.6                     | 0.0                        | ±0.5                 |
| 110.4                     | 110.4                     | 0.0                        | ±0.5                 |
| 110.2                     | 110.2                     | 0.0                        | ±0.5                 |
| 110.0                     | 110.0                     | 0.0                        | ±0.5                 |
| 109.8                     | 109.8                     | 0.0                        | ±0.5                 |
| 109.6                     | 109.6                     | 0.0                        | ±0.5                 |
| 109.4                     | 109.4                     | 0.0                        | ±0.5                 |
| 109.2                     | 109.2                     | 0.0                        | ±0.5                 |
| 109.0                     | 109.0                     | 0.0                        | ±0.5                 |
| 108.8                     | 108.8                     | 0.0                        | ±0.5                 |
| 108.6                     | 108.6                     | 0.0                        | ±0.5                 |
| 108.4                     | 108.4                     | 0.0                        | ±0.5                 |
| 108.2                     | 108.2                     | 0.0                        | ±0.5                 |
| 108.0                     | 108.0                     | 0.0                        | ±0.5                 |
| 107.8                     | 107.8                     | 0.0                        | ±0.5                 |
| 107.6                     | 107.6                     | 0.0                        | ±0.5                 |
| 107.4                     | 107.4                     | 0.0                        | ±0.5                 |
| 107.2                     | 107.2                     | 0.0                        | ±0.5                 |
| 107.0                     | 107.0                     | 0.0                        | ±0.5                 |
| 106.8                     | 106.8                     | 0.0                        | ±0.5                 |
| 106.6                     | 106.6                     | 0.0                        | ±0.5                 |
| 106.4                     | 106.4                     | 0.0                        | ±0.5                 |
| 106.2                     | 106.2                     | 0.0                        | ±0.5                 |
| 106.0                     | 106.0                     | 0.0                        | ±0.5                 |
| 105.8                     | 105.8                     | 0.0                        | ±0.5                 |
| 105.6                     | 105.6                     | 0.0                        | ±0.5                 |
| 105.4                     | 105.4                     | 0.0                        | ±0.5                 |
| 105.2                     | 105.2                     | 0.0                        | ±0.5                 |
| 105.0                     | 105.0                     | 0.0                        | ±0.5                 |
| 104.8                     | 104.8                     | 0.0                        | ±0.5                 |
| 104.6                     | 104.6                     | 0.0                        | ±0.5                 |
| 104.4                     | 104.4                     | 0.0                        | ±0.5                 |
| 104.2                     | 104.2                     | 0.0                        | ±0.5                 |
| 104.0                     | 104.0                     | 0.0                        | ±0.5                 |
| 103.8                     | 103.8                     | 0.0                        | ±0.5                 |
| 103.6                     | 103.6                     | 0.0                        | ±0.5                 |
| 103.4                     | 103.4                     | 0.0                        | ±0.5                 |
| 103.2                     | 103.2                     | 0.0                        | ±0.5                 |
| 103.0                     | 103.0                     | 0.0                        | ±0.5                 |
| 102.8                     | 102.8                     | 0.0                        | ±0.5                 |
| 102.6                     | 102.6                     | 0.0                        | ±0.5                 |
| 102.4                     | 102.4                     | 0.0                        | ±0.5                 |
| 102.2                     | 102.2                     | 0.0                        | ±0.5                 |
| 102.0                     | 102.0                     | 0.0                        | ±0.5                 |
| 101.8                     | 101.8                     | 0.0                        | ±0.5                 |
| 101.6                     | 101.6                     | 0.0                        | ±0.5                 |
| 101.4                     | 101.4                     | 0.0                        | ±0.5                 |
| 101.2                     | 101.2                     | 0.0                        | ±0.5                 |
| 101.0                     | 101.0                     | 0.0                        | ±0.5                 |
| 100.8                     | 100.8                     | 0.0                        | ±0.5                 |
| 100.6                     | 100.6                     | 0.0                        | ±0.5                 |
| 100.4                     | 100.4                     | 0.0                        | ±0.5                 |
| 100.2                     | 100.2                     | 0.0                        | ±0.5                 |
| 100.0                     | 100.0                     | 0.0                        | ±0.5                 |
| 99.8                      | 99.8                      | 0.0                        | ±0.5                 |
| 99.6                      | 99.6                      | 0.0                        | ±0.5                 |
| 99.4                      | 99.4                      | 0.0                        | ±0.5                 |
| 99.2                      | 99.2                      | 0.0                        | ±0.5                 |
| 99.0                      | 99.0                      | 0.0                        | ±0.5                 |
| 98.8                      | 98.8                      | 0.0                        | ±0.5                 |
| 98.6                      | 98.6                      | 0.0                        | ±0.5                 |
| 98.4                      | 98.4                      | 0.0                        | ±0.5                 |

# SITHIPORN ASSOCIATES CO., LTD.

## CALIBRATION LABORATORY

401/402 Sukhvit Road, Bangkok, Thailand 10110  
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Cert. No.: ACL20006  
Job No.: VC07AC0043  
Page: 2 of 8

Calibration Procedure: EP-A0101

### Calibration Method:

This equipment was calibrated by follow on IEC 61672-1 (2013) Standard for sound level meter (SLM).  
The SLM had been to Acoustical and Electrical signal tests of Frequency weighting with Anechoic chamber and Reference Standard Instruments.  
For this result of each item were made by observation of each instrument display and also with SLM's display.

### Condition of this result of calibration:

#### 1. Reference Standard Instruments

| Instrument              | Model    | Serial No. | Cert. No.     | Due Date  |
|-------------------------|----------|------------|---------------|-----------|
| Waveform Generator      | 33211A   | MY48017073 | LI-0019-23    | 07 FEB 24 |
| Waveform Generator      | 33211A   | MY2202742  | EP-0019-21    | 07 FEB 24 |
| Digital Multimeter      | 34461A   | MY3320104  | EP-LRP 100266 | 13 FEB 24 |
| Digital Multimeter      | 34461A   | MY3320076  | EP-LRP 100266 | 13 FEB 24 |
| Digital Multimeter      | 34461A   | MY3320171  | EP-LRP 100266 | 14 FEB 24 |
| Programmable Attenuator | MA1 1070 | 62110114   | EP-0011-23    | 06 FEB 24 |
| Condenser Microphone    | 4180     | 2977600    | AA-1101-23    | 14 FEB 24 |
| Microphone Amplifier    | NA-426AL | 3456085    | AA-1002-23    | 14 FEB 24 |

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

3. The certificate is available to the interested parties of user (customer) as:

- National Institute of Metrology (Thailand),
- Thailand Institute of Scientific and Technological Research (TISTR)

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Cert. No.: ACL20006  
Job No.: VC07AC0043  
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### Summary of Measurement Result:

| Parameter  | Uncertainty<br>(dB) | Maximum permitted<br>uncertainty of<br>measurement (dB) |
|--|---------------------|---|
| 1. Absolute sensitivity                              | 0.2                 | N/A   |
| 2. Self-generated noise                              | 0.2                 | N/A   |
| 3. Acoustical signal tests of frequency weightings   |                     |   |
| 3.1. 125 Hz  | 0.3                 | 0.6   |
| 3.2. 1000 Hz   | 0.3                 | 0.6   |
| 3.3. 4000 Hz   | 0.3                 | 0.7   |
| 4. Electrical signal tests of frequency weightings   |                     |   |
| 4.1. For 10 Hz to 4 kHz                              | 0.3                 | 0.6   |
| 4.2. For 4 kHz to 10 kHz                             | 0.3                 | 0.7   |
| 4.3. For 10 kHz to 20 kHz                            | 0.2                 | 1.0   |
| 5. Frequency and time weightings at 1 kHz            | 0.2                 | 0.2   |
| 6. Long-term stability                               | 0.2                 | 0.2   |
| 7. Level linearity on the reference level range      | 0.2                 | 0.2   |
| 8. Level linearity including the level range control | 0.2                 | 0.2   |
| 9. Time-based response                               | 0.2                 | 0.3   |
| 10. Peak C-weight level                              | 0.2                 | 0.35  |
| 11. Overload indication                              | 0.2                 | 0.25  |
| 12. High-level stability                             | 0.3                 | 0.3   |

### Result of calibration:

#### 1. Absolute sensitivity

| Reference<br>Acoustic Signal<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>(dB) | Acceptance<br>Limit<br>(dB) |
|--------------------------------------|---------------------------|-------------------|-----------------------------|
| 93.9 (1 kHz)                         | 93.8                      | -0.1              | +0.3                        |

#### 2. Self-generated noise

| Measured Value<br>(dB) |
|------------------------|
| 11.8                   |

2.2. The measurement of the sound level meter was replaced by external signal input device.

| Frequency<br>Weighting | Measured value<br>(dB) |
|------------------------|------------------------|
| A-weight               | 8.9                    |
| C-weight               | 18.4                   |
| Flat                   | 22.2                   |

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

More free field acoustic response at a level of 94 dB

| Frequency<br>(Hz) | Deviation from reference frequency weighting response (dB) | Acceptance<br>Limit |
|-------------------|--|---------------------|
| 125               | 0.3  | +0.3                |
| 1000              | 0.2  | +0.6                |
| 4000              | 0.8  | +0.7                |

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### 4. Electrical signal tests of frequency weightings

Weighting response with reference to 1 kHz

| Frequency<br>(Hz) | Flat | C-weight | A-weight | Acceptance<br>Limit |
|-------------------|------|----------|----------|---------------------|
| 80                | -0.1 | -0.1     | -0.1     | +0.9                |
| 125               | -0.1 | 0.0      | -0.1     | +1.5                |
| 250               | -0.1 | 0.0      | -0.1     | +1.1                |
| 500               | 0.0  | 0.0      | -0.1     | +1.1                |
| 1000              | 0.0  | 0.0      | 0.0      | +1.1                |
| 2000              | 0.0  | 0.0      | 0.0      | +2.0                |
| 4000              | 0.0  | 0.0      | 0.0      | +2.0                |
| 8000              | 0.0  | 0.0      | 0.0      | +1.9                |

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

| Frequency<br>Weighting | Anticipated<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>(dB) | Acceptance<br>Limit<br>(dB) |
|------------------------|------------------------------|---------------------------|-------------------|-----------------------------|
| A-weight               | 96.0                         | 95.0                      | -0.1              | +0.2                        |
| C-weight               | 96.0                         | 97.0                      | +0.1              | +0.2                        |
| Flat                   | 96.0                         | 96.0                      | 0.0               | +0.2                        |

### 3.2 Time weighting at 1 kHz

| Frequency<br>Weighting | Anticipated<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>(dB) | Acceptance<br>Limit<br>(dB) |
|------------------------|------------------------------|---------------------------|-------------------|-----------------------------|
| Fast                   | 96.0                         | 95.5                      | -0.1              | +0.3                        |
| Slow                   | 96.0                         | 95.5                      | -0.1              | +0.3                        |
| Imp                    | 96.0                         | 96.0                      | 0.0               | +0.3                        |

### 6. Long-term stability

| Frequency<br>Weighting | SLM Display<br>at initial<br>(dB) | SLM Display<br>at final<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limit<br>(dB) |
|------------------------|-----------------------------------|---------------------------------|----------------------------|-----------------------------|
| A-weight               | 96.0                              | 96.0                            | 0.0                        | +0.3                        |

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

| Anticipated<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limit<br>(dB) |
|------------------------------|---------------------------|----------------------------|-----------------------------|
| 17.0                         | 17.0                      | 0.0                        | +1.3                        |
| 19.0                         | 19.1                      | +0.1                       | +1.3                        |
| 21.0                         | 21.1                      | +0.1                       | +1.3                        |
| 23.0                         | 23.1                      | +0.1                       | +1.3                        |
| 25.0                         | 25.0                      | 0.0                        | +1.3                        |
| 27.0                         | 27.0                      | 0.0                        | +1.3                        |
| 29.0                         | 29.0                      | 0.0                        | +1.3                        |
| 31.0                         | 31.0                      | 0.0                        | +1.3                        |
| 33.0                         | 33.0                      | 0.0                        | +1.3                        |
| 35.0                         | 35.0                      | 0.0                        | +1.3                        |
| 37.0                         | 37.0                      | 0.0                        | +1.3                        |
| 39.0                         | 39.0                      | 0.0                        | +1.3                        |
| 41.0                         | 41.0                      | 0.0                        | +1.3                        |
| 43.0                         | 43.0                      | 0.0                        | +1.3                        |
| 45.0                         | 45.0                      | 0.0                        | +1.3                        |
| 47.0                         | 47.0                      | 0.0                        | +1.3                        |
| 49.0                         | 49.0                      | 0.0                        | +1.3                        |
| 51.0                         | 51.0                      | 0.0                        | +1.3                        |
| 53.0                         | 53.0                      | 0.0                        | +1.3                        |
| 55.0                         | 55.0                      | 0.0                        | +1.3                        |
| 57.0                         | 57.0                      | 0.0                        | +1.3                        |
| 59.0                         | 59.0                      | 0.0                        | +1.3                        |
| 61.0                         | 61.0                      | 0.0                        | +1.3                        |
| 63.0                         | 63.0                      | 0.0                        | +1.3                        |
| 65.0                         | 65.0                      | 0.0                        | +1.3                        |
| 67.0                         | 67.0                      | 0.0                        | +1.3                        |
| 69.0                         | 69.0                      | 0.0                        | +1.3                        |
| 71.0                         | 71.0                      | 0.0                        | +1.3                        |
| 73.0                         | 73.0                      | 0.0                        | +1.3                        |
| 75.0                         | 75.0                      | 0.0                        | +1.3                        |
| 77.0                         | 77.0                      | 0.0                        | +1.3                        |
| 79.0                         | 79.0                      | 0.0                        | +1.3                        |
| 81.0                         | 81.0                      | 0.0                        | +1.3                        |
| 83.0                         | 83.0                      | 0.0                        | +1.3                        |
| 85.0                         | 85.0                      | 0.0                        | +1.3                        |
| 87.0                         | 87.0                      | 0.0                        | +1.3                        |
| 89.0                         | 89.0                      | 0.0                        | +1.3                        |
| 91.0                         | 91.0                      | 0.0                        | +1.3                        |
| 93.0                         | 93.0                      | 0.0                        | +1.3                        |
| 95.0                         | 95.0                      | 0.0                        | +1.3                        |
| 97.0                         | 97.0                      | 0.0                        | +1.3                        |
| 99.0                         | 99.0                      | 0.0                        | +1.3                        |
| 101.0                        | 101.0                     | 0.0                        | +1.3                        |
| 103.0                        | 103.0                     | 0.0                        | +1.3                        |
| 105.0                        | 105.0                     | 0.0                        | +1.3                        |
| 107.0                        | 107.0                     | 0.0                        | +1.3                        |
| 109.0                        | 109.0                     | 0.0                        | +1.3                        |
| 111.0                        | 111.0                     | 0.0                        | +1.3                        |
| 113.0                        | 113.0                     | 0.0                        | +1.3                        |
| 115.0                        | 115.0                     | 0.0                        | +1.3                        |
| 117.0                        | 117.0                     | 0.0                        | +1.3                        |
| 119.0                        | 119.0                     | 0.0                        | +1.3                        |
| 121.0                        | 121.0                     | 0.0                        | +1.3                        |
| 123.0                        | 123.0                     | 0.0                        | +1.3                        |
| 125.0                        | 125.0                     | 0.0                        | +1.3                        |

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Cert. No.: ACL20006  
Job No.: VC07AC0043  
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### 8. Level linearity including the level range control

| Range | Anticipated<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limit<br>(dB) |
|-------|------------------------------|---------------------------|----------------------------|-----------------------------|
| Auto  | 96.0                         | 96.0                      | 0.0                        | +1.1                        |

### 9. Time-based response

| Time<br>Weighting | Time base<br>(s) | Cycle | Anticipated<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limit<br>(dB) |
|-------------------|------------------|-------|------------------------------|---------------------------|----------------------------|-----------------------------|
| Fast              | 0.25             | 1     | 100.0                        | 100.0                     | 0.0                        | +1.5                        |
|                   | 2                | 3     | 107.0                        | 106.0                     | -0.1                       | +1.5                        |
| Slow              | 200              | 100   | 127.0                        | 127.0                     | 0.0                        | +1.0                        |
|                   | 2                | 3     | 100.0                        | 100.0                     | 0.0                        | +1.0                        |
| SLI               | 0.25             | 1     | 99.0                         | 99.0                      | 0.0                        | +1.5                        |
|                   | 2                | 3     | 100.0                        | 100.0                     | 0.0                        | +1.5                        |
| SLE               | 0.25             | 1     | 100.0                        | 100.0                     | 0.0                        | +1.5                        |
|                   | 2                | 3     | 100.0                        | 100.0                     | 0.0                        | +1.5                        |

### 10. Peak C-weight level

| Number of cycle<br># | Anticipated<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limit<br>(dB) |
|----------------------|------------------------------|---------------------------|----------------------------|-----------------------------|
| 100 signal           | 123.0                        | 123.0                     | 0.0                        | +1.0                        |
| Continuous           | 123.0                        | 123.0                     | 0.0                        | +1.0                        |
| One                  | 123.0                        | 123.0                     | 0.0                        | +1.0                        |

| Number of cycle<br># | Anticipated<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limit<br>(dB) |
|----------------------|------------------------------|---------------------------|----------------------------|-----------------------------|
| 100 signal           | 123.0                        | 123.0                     | 0.0                        | +1.0                        |
| Continuous           | 123.0                        | 123.0                     | 0.0                        | +1.0                        |
| One                  | 123.0                        | 123.0                     | 0.0                        | +1.0                        |

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Cert. No.: ACL20006  
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### 11. Overload indication

| Measured value (dB)        | Deviation<br>Value<br>(dB) | Acceptance<br>Limit<br>(dB) |
|----------------------------|----------------------------|-----------------------------|
| Positive<br>one-half cycle | -0.2                       | +1.5                        |
| Negative<br>one-half cycle | -0.2                       | +1.5                        |

### 12. High-level stability

| Frequency<br>Weighting | SLM Display<br>at initial<br>(dB) | SLM Display<br>at final<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limit<br>(dB) |
|------------------------|-----------------------------------|---------------------------------|----------------------------|-----------------------------|
| A-weight               | 137.0                             | 137.0                           | 0.0                        | +0.3                        |

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2 or any value below the coverage factor of approximately 95%.

### End of Calibration Certificate

# THAILAND NATIONAL INSTITUTE OF METROLOGY

Request No.: 21-070231

MIT No.: B-16-5167

## CALIBRATION CERTIFICATE

Submitted by: AIS (Law) Co., Ltd.  
Address: 104 Phrasanghae 42, Phrasanghae Rd., Kwang Phrasanghae, Khwaeng Phrasanghae, Bangkok 10250  
Calibrated at: Phrasanghae Industrial Zone, Phrasanghae Rd., A-Mong, Phrasanghae, Bangkok 10250

Instrument Calibrated: Sound Level Meter  
Manufacturer: YSI  
Model: SL-42  
Serial No.: 401010101 (RUC 1000000)  
Measuring: 125 Hz to 10 kHz  
Principal: NIST 21-070231  
Standard used: 1. IEC 61672-1:2013 (S/N 1000000)  
2. IEC 61672-1:2013 (S/N 1000000)  
3. IEC 61672-1:2013 (S/N 1000000)  
4. IEC 61672-1:2013 (S/N 1000000)  
5. IEC 61672-1:2013 (S/N 1000000)  
6. IEC 61672-1:2013 (S/N 1000000)  
7. IEC 61672-1:2013 (S/N 1000000)  
8. IEC 61672-1:2013 (S/N 1000000)  
9. IEC 61672-1:2013 (S/N 1000000)  
10. IEC 61672-1:2013 (S/N 1000000)

Date of Receipt: 21 Feb 2024  
Date of Calibration: 21 Feb 2024

# THAILAND NATIONAL INSTITUTE OF METROLOGY

Request No.: 21-070231

MIT No.: B-16-5167

Power Amplifier (RUC 1000000) (S/N 1000000)  
Speaker (Yamaha) (RUC 1000000) (S/N 1000000)  
Digital Multimeter (Agilent) (RUC 1000000) (S/N 1000000)  
Programmable Attenuator (Agilent) (RUC 1000000) (S/N 1000000)

Calibration Procedure:  
This instrument was calibrated by using reference procedure on IEC 61672-1:2013 which were based on IEC 61672-1:2013 for sound level meter. Part 5 Two-sine tests (2013). These calibration procedures were related to the electrical and acoustic signal test. The electrical signal test was carried out with the (two-sine) method. The acoustic signal test was performed on an anechoic room with the comparison of reference method.

This instrument has been calibrated against standards maintained at the National Institute of Metrology (Thailand).

The information on actual reading is attached below with the uncertainty limits applied to the measured values only.

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

Date of Calibration: 21 Feb 2024





THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH CENTER

Request No. 21-67131

MTC No. 111-1P-180/014

## 1. Absolute Sensitivity

| Reference Source | Measured value (dB) | Declared value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|------------------|---------------------|---------------------|-----------------------|------------------|---|
| Sigma 100        | 113.1               | 113.5               | 0.0                   | 0.0              | N/A   |

Note: The external calibration adjustment was fully performed. The internal calibration adjustment was then completed at the  $\pm 0.1$  dB.

## 2. Self-generated noise

## 2.1 Normal test

| Measured value (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|---------------------|------------------|---|
| 20.4                | 0.0              | N/A   |

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

| Frequency Weighting | Measured value (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|---------------------|---------------------|------------------|---|
| A-weight            | 14.9                | 0.0              | N/A   |
| C-weight            | 19.7                | 0.0              | N/A   |
| Flat                | 24.0                | 0.0              | N/A   |

Date of Calibration: 21 Feb 2024

S/S



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH CENTER

Request No. 21-67231

MTC No. 111-1P-180/014

## 3. Acoustical signal test of frequency weightings

| Frequency (Hz) | Declared value (dB) | Measured value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|----------------|---------------------|---------------------|-----------------------|------------------|---|
| 125            | 0.0                 | 0.4                 | 0.0                   | 0.5              | 0.5   |
| 1000           | 0.0                 | 0.0                 | 0.0                   | 0.5              | 0.5   |
| 4000           | 0.0                 | 0.0                 | 0.0                   | 0.5              | 0.5   |

## 4. Electrical signal test of frequency weightings

| Frequency (Hz) | Declared value (dB) | Measured value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|----------------|---------------------|---------------------|-----------------------|------------------|---|
| 63             | 0.0                 | 0.0                 | 0.0                   | 0.0              | 0.0   |
| 125            | 0.0                 | 0.1                 | 0.0                   | 0.5              | 0.5   |
| 250            | 0.0                 | 0.0                 | 0.0                   | 0.5              | 0.5   |
| 500            | 0.0                 | 0.1                 | 0.0                   | 0.5              | 0.5   |
| 1000           | 0.0                 | 0.0                 | 0.0                   | 0.5              | 0.5   |
| 2000           | -0.2                | -0.2                | -0.2                  | 0.5              | 0.5   |
| 4000           | -0.3                | -0.3                | -0.3                  | 0.5              | 0.5   |
| 8000           | 0.0                 | 0.0                 | 0.0                   | 0.5              | 0.5   |

Date of Calibration: 21 Feb 2024

S/S



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH CENTER

Request No. 21-67131

MTC No. 111-1P-180/014

## 5. Long term stability

| Time  | Measured value (dB) | Declared value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|-------|---------------------|---------------------|-----------------------|------------------|---|
| Start | N/A                 |                     |                       |                  |   |
| End   | 94.0                | 94.0                | 0.0                   | 0.0              | 0.0   |

## 6. Frequency and time weightings at 1 kHz

## 6.1 Frequency weightings at 1 kHz

| Frequency Weighting | Measured value (dB) | Declared value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|---------------------|---------------------|---------------------|-----------------------|------------------|---|
| A-weight            | 94.6                | 94.6                | 0.0                   | 0.2              | 0.2   |
| C-weight            | 94.6                | 94.6                | 0.0                   | 0.2              | 0.2   |
| Flat                | 94.6                | 94.6                | 0.0                   | 0.2              | 0.2   |

## 6.2 Time weightings at 1 kHz

| Frequency Weighting | Measured value (dB) | Declared value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|---------------------|---------------------|---------------------|-----------------------|------------------|---|
| Fast                | 94.6                | 94.6                | 0.0                   | 0.2              | 0.2   |
| Slow                | 94.6                | 94.6                | 0.0                   | 0.2              | 0.2   |
| Log                 | 94.6                | 94.6                | 0.0                   | 0.2              | 0.2   |

Date of Calibration: 21 Feb 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH CENTER

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MTC No. 111-1P-180/014

## 7. Level linearity on the reference level range

| Measured value (dB) | Declared value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|---------------------|---------------------|-----------------------|------------------|---|
| 135                 | 135.1               | 0.0                   | 0.3              | 0.3   |
| 130                 | 130.1               | 0.0                   | 0.3              | 0.3   |
| 125                 | 125.1               | 0.0                   | 0.3              | 0.3   |
| 120                 | 120.1               | 0.0                   | 0.3              | 0.3   |
| 115                 | 115.1               | 0.0                   | 0.3              | 0.3   |
| 110                 | 110.1               | 0.0                   | 0.3              | 0.3   |
| 105                 | 105.1               | 0.0                   | 0.3              | 0.3   |
| 100                 | 100.1               | 0.0                   | 0.3              | 0.3   |
| 95                  | 95.1                | 0.0                   | 0.3              | 0.3   |
| 90                  | 90.1                | 0.0                   | 0.3              | 0.3   |
| 85                  | 85.1                | 0.0                   | 0.3              | 0.3   |
| 80                  | 80.1                | 0.0                   | 0.3              | 0.3   |
| 75                  | 75.1                | 0.0                   | 0.3              | 0.3   |
| 70                  | 70.1                | 0.0                   | 0.3              | 0.3   |
| 65                  | 65.1                | 0.0                   | 0.3              | 0.3   |
| 60                  | 60.1                | 0.0                   | 0.3              | 0.3   |

Date of Calibration: 21 Feb 2024

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## 7.1 Level linearity on the reference level range (cont.)

| Measured value (dB) | Declared value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|---------------------|---------------------|-----------------------|------------------|---|
| 55                  | 55.1                | 0.0                   | 0.3              | 0.3   |
| 50                  | 50.1                | 0.0                   | 0.3              | 0.3   |
| 45                  | 45.1                | 0.0                   | 0.3              | 0.3   |
| 40                  | 40.1                | 0.0                   | 0.3              | 0.3   |
| 35                  | 35.1                | 0.0                   | 0.3              | 0.3   |
| 30                  | 30.1                | 0.0                   | 0.3              | 0.3   |
| 25                  | 25.1                | 0.0                   | 0.3              | 0.3   |
| 20                  | 20.1                | 0.0                   | 0.3              | 0.3   |
| 15                  | 15.1                | 0.0                   | 0.3              | 0.3   |
| 10                  | 10.1                | 0.0                   | 0.3              | 0.3   |
| 5                   | 5.1                 | 0.0                   | 0.3              | 0.3   |

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

| Range  | Measured value (dB) | Declared value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|--------|---------------------|---------------------|-----------------------|------------------|---|
| 55-135 | 90.0                | 90.0                | 0.0                   | 0.3              | 0.3   |

Date of Calibration: 21 Feb 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH CENTER

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

| Range  | Measured value (dB) | Declared value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|--------|---------------------|---------------------|-----------------------|------------------|---|
| 55-135 | 90.0                | 90.0                | 0.0                   | 0.3              | 0.3   |

## 9. Tone burst response

| Time Weighting | Frequency (Hz) | Measured value (dB) | Declared value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|----------------|----------------|---------------------|---------------------|-----------------------|------------------|---|
| Fast           | 200            | 120.0               | 120.0               | 0.0                   | 0.3              | 0.3   |
|                | 2              | 109.5               | 109.5               | +1.0, -2.5            | 0.20             | 0.3   |
| Slow           | 200            | 120.0               | 120.0               | 0.0                   | 0.3              | 0.3   |
|                | 2              | 109.5               | 109.5               | +1.0, -2.5            | 0.20             | 0.3   |
| Log            | 200            | 120.0               | 120.0               | 0.0                   | 0.3              | 0.3   |
|                | 2              | 109.5               | 109.5               | +1.0, -2.5            | 0.20             | 0.3   |

Date of Calibration: 21 Feb 2024

S/S



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH CENTER

Request No. 21-67131

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## 10. Pulse C-weight level

| Measured value (dB) | Declared value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|---------------------|---------------------|-----------------------|------------------|---|
| Example cycle       | 124.4               | 124.4                 | 0.0              | 0.0   |
| Positive half-cycle | 124.4               | 124.4                 | 0.0              | 0.0   |
| Negative half-cycle | 124.4               | 124.4                 | 0.0              | 0.0   |

## 11. Overload indication

| Measured value (dB) | Declared value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|---------------------|---------------------|-----------------------|------------------|---|
| Fast                | 137.0               | 137.0                 | 0.0              | 0.0   |
| Slow                | 137.0               | 137.0                 | 0.0              | 0.0   |
| Log                 | 137.0               | 137.0                 | 0.0              | 0.0   |

## 12. High level stability

| Time  | Measured value (dB) | Declared value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|-------|---------------------|---------------------|-----------------------|------------------|---|
| Start | 129.0               | 129.0               | 0.0                   | 0.0              | 0.0   |
| End   | 129.0               | 129.0               | 0.0                   | 0.0              | 0.0   |

Calibrated by: S. P. S. S.

Approved by: S. P. S. S.

Date of Calibration: 21 Feb 2024

Date of Issue: 21 Feb 2024

Date of Certificate: 21 Feb 2024

## SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

451-451/5 Sathorn Rd., Bangkok 10120 THAILAND

Tel: 02-255-8030 Fax: 02-255-1079 Email: info@sithiporn.com Web: www.sithiporn.com



MTC No. 111-1P-180/014

Page: 1 of 1

## Calibration Certificate

Equipment: SOUND LEVEL METER  
Manufacturer: RION  
Model: NL-92 / Microphone: UC-92 / Pre-amplifier: NH-24  
Serial No.: 008516 / 15775 / 10641  
ID No.: BAK F50106

## Condition As Found:

Customer: ALS LABORATORY GROUP (THAILAND) LTD., LTD.  
101 PHATTANAKAN 40 PHATTANAKAN ROAD,  
KHUANG PHATTANAKAN KHUANG PHATTANAKAN,  
BANGKOK, 10250 THAILAND

Location: 4 23.0 x 3.1 °C  
Ambient Temperature: 1 18.0 x 3.3 °C  
Pressure: 1 101.3 x 2.0 hPa  
Relative Humidity: 1 50.0 x 2.0 %

Received Date: 07 NOVEMBER 2023  
Calibration Date: 20-30 NOVEMBER 2023  
Date of Issue: 06 DECEMBER 2023

Calibrated by: N. P. S. S.

Approved by: T. P. S. S.

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

## SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

## Continuation of Calibration Certificate

Request No. 21-67131

MTC No. 111-1P-180/014

Page: 2 of 2

## Calibration Method:

This equipment was calibrated by based on ISO/IEC 17025 Standard for sound level meter (SLM).  
The SLM had been in Acoustical and Electrical signal test of frequency weighting with Acoustic chamber and Reference  
Standard Instruments.

For test results of each item were made by observation of each measurement display and also with SLM's display

## Condition of this result of calibration:

| Instrument              | Model    | Serial No.  | Cert. No.  | Exp. Date |
|-------------------------|----------|-------------|------------|-----------|
| Waveform Generator      | 33219A   | MA 481 1075 | 11-0000-23 | 07-01-24  |
| Waveform Generator      | 33511B   | MY5232742   | 11-0010-23 | 07-01-24  |
| Digital Multimeter      | 33461A   | MY5322064   | 11-0010-23 | 07-01-24  |
| Digital Multimeter      | 33461A   | MY5322076   | 11-0010-23 | 07-01-24  |
| Digital Multimeter      | 33461A   | MY5322073   | 11-0010-23 | 07-01-24  |
| Programmable Attenuator | MA7-1070 | 82101473    | 11-0010-23 | 07-01-24  |
| Condenser Microphone    | 4180     | 247566      | AA-0021-23 | 14-01-24  |
| Measuring Amplifier     | NA-42KAJ | 349499      | AA-0021-23 | 14-01-24  |

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

4. This certificate is acceptable in the international system of unit measured at:

5.1 National Institute of Metrology (Thailand)

5.2 Thailand Institute of Scientific and Technological Research (TISTR)

T. P. S. S.



Cert. No.: ACL33336  
Job No.: VC87AC0014  
Pages: 3 of 8

## Result of calibration:

## 1. Absolute sensitivity

| Reference Acoustic Signal (dB) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|--------------------------------|---------------------|----------------|-----------------------|
| 93.9 (93.9)                    | 93.6                | 0.3            | ±0.3                  |

## 2. Self-generated noise

## 2.1 Normal test

| Measured Value (dB) |
|---------------------|
| 15.3                |

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

| Frequency Weighting (dB) | Measured value (dB) |
|--------------------------|---------------------|
| A-weight                 | 11.6                |
| C-weight                 | 17.1                |
| Flat                     | 23.5                |

## 3. Acoustic signal tests of frequency weightings

## 3.1 Free-field acoustic response at a level of 94 dB

| Frequency (Hz) | Deviation from reference frequency weighting response curve (dB) | Acceptance Limits |
|----------------|--|-------------------|
| 125            | 0.0  | ±0.5              |
| 1000           | 0.0  | ±0.5              |
| 5000           | 0.0  | ±0.5              |

SITHIPORN ASSOCIATES CO., LTD.

T. Petch

Cert. No.: ACL33336  
Job No.: VC87AC0014  
Pages: 3 of 8

## 8. Level linearity including the level range control

| Range | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|-------|------------------------|---------------------|---------------------|------------------------|
| Auto  | 94.0                   | 94.0                | 0.0                 | ±0.1                   |

## 9. Tone burst response

| Type | Tone burst duration, 10 (ms) | Clock | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|------|------------------------------|-------|------------------------|---------------------|---------------------|------------------------|
| Fast | 0.25                         | 1     | 108.0                  | 107.9               | -0.1                | ±0.5                   |
|      | 2                            | 8     | 117.0                  | 117.0               | 0.0                 | ±0.5                   |
|      | 200                          | 80    | 134.0                  | 134.0               | 0.0                 | ±1.0                   |
| Slow | 0.25                         | 1     | 108.0                  | 108.0               | 0.0                 | ±0.5                   |
|      | 2                            | 8     | 117.0                  | 117.0               | 0.0                 | ±0.5                   |
|      | 200                          | 80    | 134.0                  | 134.0               | 0.0                 | ±1.0                   |
| SEL  | 0.25                         | 1     | 99.0                   | 99.0                | 0.0                 | ±0.5                   |
|      | 2                            | 8     | 108.0                  | 108.0               | 0.0                 | ±0.5                   |
|      | 200                          | 80    | 134.0                  | 134.0               | 0.0                 | ±1.0                   |

## 10. Pink C, sound level

| Number of cycle to new signal | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|-------------------------------|------------------------|---------------------|---------------------|------------------------|
| Continuous                    | 133.0                  | 133.0               | 0.0                 | ±0.6                   |
| Fast                          | 136.8                  | 136.8               | 0.0                 | ±0.8                   |

| Number of cycle to new signal | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|-------------------------------|------------------------|---------------------|---------------------|------------------------|
| Continuous                    | 133.0                  | 133.0               | 0.0                 | ±0.6                   |
| Positive half cycle           | 133.0                  | 133.0               | 0.0                 | ±0.6                   |
| Negative half cycle           | 133.0                  | 133.0               | 0.0                 | ±0.6                   |

SITHIPORN ASSOCIATES CO., LTD.

T. Petch

Cert. No.: ACL34005  
Job No.: VC87AC0014  
Pages: 2 of 8

## Calibration Procedure: (PAC-01)

## Calibration Method:

This equipment was calibrated by follow on (IEC-61672-2) (2013) Standard for sound level meter (SLM). The SLM had been in Acoustic and Electrical signal tests of frequency weighting with Acoustic chamber and Reference Standard Instruments.

For test results of each item were made by observation of each instrument display and also with SLM's display.

## Condition of this result of calibration:

## 1. Reference Standard Instruments

| Instrument             | Model    | Serial No. | Cert. No.      | Exp. Date |
|------------------------|----------|------------|----------------|-----------|
| Sound level meter      | 7210A    | MY4017076  | IF-009-23      | 07-11-24  |
| Sound level meter      | 3510H    | MY3230762  | IF-010-23      | 07-11-24  |
| Digital Multimeter     | 34461A   | MY13220164 | UCL-BP-10-0266 | 13-11-24  |
| Digital Multimeter     | 34461A   | MY13220164 | UCL-BP-10-0266 | 13-11-24  |
| Digital Multimeter     | 34461A   | MY13220164 | UCL-BP-10-0266 | 13-11-24  |
| Programmable Acoustics | MA1-1270 | 62100114   | FF-001-23      | 06-12-24  |
| Concussion Microphone  | 4101     | 2977906    | AA-101-21      | 14-11-24  |
| Measure Amplifier      | NA-42KA1 | 34560495   | AA-3002-23     | 14-11-24  |

2. This result of calibration was found accurate as shown in date and place of calibration for the calibration item only.

3. This certificate is accurate to the maximum extent of test measurement as:

3.1 National Institute of Metrology (Thailand)

3.2 Thailand Institute of Scientific and Technological Research (TISTR)

T. Petch

Cert. No.: ACL33336  
Job No.: VC87AC0014  
Pages: 5 of 8

## 4. Electrical signal tests of frequency weightings

## Weighting network response with reference to 1 kHz

| Frequency (Hz) | Flat | C-weight | A-weight | Acceptance Limits |
|----------------|------|----------|----------|-------------------|
| 63             | 0.0  | 0.0      | 0.0      | ±0.5              |
| 125            | 0.0  | 0.0      | 0.0      | ±0.5              |
| 250            | 0.0  | 0.0      | 0.0      | ±0.5              |
| 500            | 0.0  | 0.0      | 0.0      | ±0.5              |
| 1000           | 0.0  | 0.0      | 0.0      | ±0.5              |
| 2000           | 0.0  | 0.0      | 0.0      | ±0.5              |
| 4000           | 0.0  | 0.0      | 0.0      | ±0.5              |
| 8000           | 0.0  | 0.0      | 0.0      | ±0.5              |

## 5. Frequency and time weightings at 1 kHz

## 5.1 Frequency weightings at 1 kHz

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

## 5.2 Time weightings at 1 kHz

| Frequency Weighting | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---------------------|------------------------|---------------------|---------------------|------------------------|
| Fast                | 94.0                   | 94.0                | 0.0                 | ±0.2                   |
| Slow                | 94.0                   | 94.0                | 0.0                 | ±0.2                   |
| Imp                 | 94.0                   | 94.0                | 0.0                 | ±0.2                   |

## 6. Leveling noise stability

| Frequency Weighting | SLM Display at initial (dB) | SLM Display at final (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---------------------|-----------------------------|---------------------------|---------------------|------------------------|
| A-weight            | 94.0                        | 94.0                      | 0.0                 | ±0.2                   |

SITHIPORN ASSOCIATES CO., LTD.

T. Petch

Cert. No.: ACL33336  
Job No.: VC87AC0014  
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## 11. Overload indicators

| Measured value (dB)      | Deviated Value (dB) | Acceptance Limits (dB) |
|--------------------------|---------------------|------------------------|
| Positive over-half cycle | 80.8                | ±0.1                   |
| Negative over-half cycle | 80.8                | ±0.1                   |

## 12. High level stability

| Frequency Weighting | SLM Display at initial (dB) | SLM Display at final (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---------------------|-----------------------------|---------------------------|---------------------|------------------------|
| A-weight            | 117.2                       | 117.0                     | 0.0                 | ±0.3                   |

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor  $k=2$  or a 95% level of confidence of approximately 95%.

End of Calibration Certificate

SITHIPORN ASSOCIATES CO., LTD.

T. Petch

Cert. No.: ACL34005  
Job No.: VC87AC0014  
Pages: 3 of 8

## Summary of Measurement Result:

| Parameter  | Uncertainty (dB) | Maximum-permitted uncertainty of measurement (dB) |
|--|------------------|---|
| 1. Absolute sensitivity                              | 0.2              | N/A   |
| 2. Self-generated noise                              | 0.2              | N/A   |
| 3. Acoustic signal tests of frequency weighting      | 0.3              | 0.8   |
| 4. Electrical signal tests of frequency weightings   | 0.3              | 0.7   |
| 5. Frequency and time weightings at 1 kHz            | 0.3              | 0.8   |
| 6. Leveling noise stability                          | 0.1              | 0.3   |
| 7. Level linearity including the level range control | 0.2              | 0.3   |
| 8. Tone burst response                               | 0.2              | 0.3   |
| 9. Pink C, sound level                               | 0.2              | 0.3   |
| 10. Overload indicators                              | 0.2              | 0.25  |
| 11. High level stability                             | 0.1              | 0.1   |

Cert. No.: ACL33336  
Job No.: VC87AC0014  
Pages: 6 of 8

## 7. Level linearity on the reference level range

| Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|------------------------|---------------------|---------------------|------------------------|
| 117.0                  | 117.0               | 0.0                 | ±0.1                   |
| 116.0                  | 116.0               | 0.0                 | ±0.1                   |
| 115.0                  | 115.0               | 0.0                 | ±0.1                   |
| 114.0                  | 114.0               | 0.0                 | ±0.1                   |
| 113.0                  | 113.0               | 0.0                 | ±0.1                   |
| 112.0                  | 112.0               | 0.0                 | ±0.1                   |
| 111.0                  | 111.0               | 0.0                 | ±0.1                   |
| 110.0                  | 110.0               | 0.0                 | ±0.1                   |
| 109.0                  | 109.0               | 0.0                 | ±0.1                   |
| 108.0                  | 108.0               | 0.0                 | ±0.1                   |
| 107.0                  | 107.0               | 0.0                 | ±0.1                   |
| 106.0                  | 106.0               | 0.0                 | ±0.1                   |
| 105.0                  | 105.0               | 0.0                 | ±0.1                   |
| 104.0                  | 104.0               | 0.0                 | ±0.1                   |
| 103.0                  | 103.0               | 0.0                 | ±0.1                   |
| 102.0                  | 102.0               | 0.0                 | ±0.1                   |
| 101.0                  | 101.0               | 0.0                 | ±0.1                   |
| 100.0                  | 100.0               | 0.0                 | ±0.1                   |
| 99.0                   | 99.0                | 0.0                 | ±0.1                   |
| 98.0                   | 98.0                | 0.0                 | ±0.1                   |
| 97.0                   | 97.0                | 0.0                 | ±0.1                   |
| 96.0                   | 96.0                | 0.0                 | ±0.1                   |
| 95.0                   | 95.0                | 0.0                 | ±0.1                   |
| 94.0                   | 94.0                | 0.0                 | ±0.1                   |
| 93.0                   | 93.0                | 0.0                 | ±0.1                   |
| 92.0                   | 92.0                | 0.0                 | ±0.1                   |
| 91.0                   | 91.0                | 0.0                 | ±0.1                   |
| 90.0                   | 90.0                | 0.0                 | ±0.1                   |
| 89.0                   | 89.0                | 0.0                 | ±0.1                   |
| 88.0                   | 88.0                | 0.0                 | ±0.1                   |
| 87.0                   | 87.0                | 0.0                 | ±0.1                   |
| 86.0                   | 86.0                | 0.0                 | ±0.1                   |
| 85.0                   | 85.0                | 0.0                 | ±0.1                   |
| 84.0                   | 84.0                | 0.0                 | ±0.1                   |
| 83.0                   | 83.0                | 0.0                 | ±0.1                   |
| 82.0                   | 82.0                | 0.0                 | ±0.1                   |
| 81.0                   | 81.0                | 0.0                 | ±0.1                   |
| 80.0                   | 80.0                | 0.0                 | ±0.1                   |
| 79.0                   | 79.0                | 0.0                 | ±0.1                   |
| 78.0                   | 78.0                | 0.0                 | ±0.1                   |
| 77.0                   | 77.0                | 0.0                 | ±0.1                   |
| 76.0                   | 76.0                | 0.0                 | ±0.1                   |
| 75.0                   | 75.0                | 0.0                 | ±0.1                   |
| 74.0                   | 74.0                | 0.0                 | ±0.1                   |
| 73.0                   | 73.0                | 0.0                 | ±0.1                   |
| 72.0                   | 72.0                | 0.0                 | ±0.1                   |
| 71.0                   | 71.0                | 0.0                 | ±0.1                   |
| 70.0                   | 70.0                | 0.0                 | ±0.1                   |
| 69.0                   | 69.0                | 0.0                 | ±0.1                   |
| 68.0                   | 68.0                | 0.0                 | ±0.1                   |
| 67.0                   | 67.0                | 0.0                 | ±0.1                   |
| 66.0                   | 66.0                | 0.0                 | ±0.1                   |
| 65.0                   | 65.0                | 0.0                 | ±0.1                   |
| 64.0                   | 64.0                | 0.0                 | ±0.1                   |
| 63.0                   | 63.0                | 0.0                 | ±0.1                   |
| 62.0                   | 62.0                | 0.0                 | ±0.1                   |
| 61.0                   | 61.0                | 0.0                 | ±0.1                   |
| 60.0                   | 60.0                | 0.0                 | ±0.1                   |
| 59.0                   | 59.0                | 0.0                 | ±0.1                   |
| 58.0                   | 58.0                | 0.0                 | ±0.1                   |
| 57.0                   | 57.0                | 0.0                 | ±0.1                   |
| 56.0                   | 56.0                | 0.0                 | ±0.1                   |
| 55.0                   | 55.0                | 0.0                 | ±0.1                   |
| 54.0                   | 54.0                | 0.0                 | ±0.1                   |
| 53.0                   | 53.0                | 0.0                 | ±0.1                   |
| 52.0                   | 52.0                | 0.0                 | ±0.1                   |
| 51.0                   | 51.0                | 0.0                 | ±0.1                   |
| 50.0                   | 50.0                | 0.0                 | ±0.1                   |
| 49.0                   | 49.0                | 0.0                 | ±0.1                   |
| 48.0                   | 48.0                | 0.0                 | ±0.1                   |
| 47.0                   | 47.0                | 0.0                 | ±0.1                   |
| 46.0                   | 46.0                | 0.0                 | ±0.1                   |
| 45.0                   | 45.0                | 0.0                 | ±0.1                   |
| 44.0                   | 44.0                | 0.0                 | ±0.1                   |
| 43.0                   | 43.0                | 0.0                 | ±0.1                   |
| 42.0                   | 42.0                | 0.0                 | ±0.1                   |
| 41.0                   | 41.0                | 0.0                 | ±0.1                   |
| 40.0                   | 40.0                | 0.0                 | ±0.1                   |
| 39.0                   | 39.0                | 0.0                 | ±0.1                   |
| 38.0                   | 38.0                | 0.0                 | ±0.1                   |
| 37.0                   | 37.0                | 0.0                 | ±0.1                   |
| 36.0                   | 36.0                | 0.0                 | ±0.1                   |
| 35.0                   | 35.0                | 0.0                 | ±0.1                   |
| 34.0                   | 34.0                | 0.0                 | ±0.1                   |
| 33.0                   | 33.0                | 0.0                 | ±0.1                   |
| 32.0                   | 32.0                | 0.0                 | ±0.1                   |
| 31.0                   | 31.0                | 0.0                 | ±0.1                   |
| 30.0                   | 30.0                | 0.0                 | ±0.1                   |
| 29.0                   | 29.0                | 0.0                 | ±0.1                   |
| 28.0                   | 28.0                | 0.0                 | ±0.1                   |
| 27.0                   | 27.0                | 0.0                 | ±0.1                   |
| 26.0                   | 25.9                | -0.1                | ±0.1                   |
| 25.0                   | 24.9                | -0.1                | ±0.1                   |



4. Electrical signal tests of frequency weighting

Weighting network response with reference to 1 kHz

| Frequency (Hz) | Flat | C-weight | A-weight | Acceptance Limit |
|----------------|------|----------|----------|------------------|
| 63             | 0.0  | 0.0      | 0.0      | +1.0             |
| 125            | 0.0  | 0.0      | 0.0      | +1.0             |
| 250            | 0.0  | 0.0      | 0.0      | +1.0             |
| 500            | 0.0  | 0.0      | 0.0      | +1.0             |
| 1000           | 0.0  | 0.0      | 0.0      | +1.0             |
| 2000           | 0.0  | 0.0      | 0.0      | +2.0             |
| 4000           | 0.0  | 0.0      | 0.0      | +3.0             |
| 8000           | 0.0  | 0.0      | 0.0      | +3.0             |

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

| Frequency Weighting (dB) | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|--------------------------|------------------------|---------------------|---------------------|-----------------------|
| A-weight                 | 94.0                   | 94.0                | 0.0                 | +0.2                  |
| C-weight                 | 94.0                   | 94.0                | 0.0                 | +0.2                  |
| Flat                     | 94.0                   | 94.0                | 0.0                 | +0.2                  |

5.2 Time weighting at 1 kHz

| Frequency Weighting (dB) | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|--------------------------|------------------------|---------------------|---------------------|-----------------------|
| Fast                     | 94.0                   | 94.0                | 0.0                 | +0.1                  |
| Slow                     | 94.0                   | 94.0                | 0.0                 | +0.1                  |
| Imp                      | 94.0                   | 94.0                | 0.0                 | +0.1                  |

6. Long-term stability

| Frequency Weighting (dB) | NLM Display at initial (dB) | NLM Display at final (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|--------------------------|-----------------------------|---------------------------|---------------------|-----------------------|
| A-weight                 | 94.0                        | 94.0                      | 0.0                 | +0.1                  |

7. Level accuracy on the reference level range

| Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|------------------------|---------------------|---------------------|-----------------------|
| 137.0                  | 137.0               | 0.0                 | +1.1                  |
| 136.0                  | 136.0               | 0.0                 | +1.1                  |
| 135.0                  | 135.0               | 0.0                 | +1.1                  |
| 134.0                  | 134.0               | 0.0                 | +1.1                  |
| 133.0                  | 133.0               | 0.0                 | +1.1                  |
| 132.0                  | 132.0               | 0.0                 | +1.1                  |
| 131.0                  | 131.0               | 0.0                 | +1.1                  |
| 130.0                  | 130.0               | 0.0                 | +1.1                  |
| 129.0                  | 129.0               | 0.0                 | +1.1                  |
| 128.0                  | 128.0               | 0.0                 | +1.1                  |
| 127.0                  | 127.0               | 0.0                 | +1.1                  |
| 126.0                  | 126.0               | 0.0                 | +1.1                  |
| 125.0                  | 125.0               | 0.0                 | +1.1                  |
| 124.0                  | 124.0               | 0.0                 | +1.1                  |
| 123.0                  | 123.0               | 0.0                 | +1.1                  |
| 122.0                  | 122.0               | 0.0                 | +1.1                  |
| 121.0                  | 121.0               | 0.0                 | +1.1                  |
| 120.0                  | 120.0               | 0.0                 | +1.1                  |
| 119.0                  | 119.0               | 0.0                 | +1.1                  |
| 118.0                  | 118.0               | 0.0                 | +1.1                  |
| 117.0                  | 117.0               | 0.0                 | +1.1                  |
| 116.0                  | 116.0               | 0.0                 | +1.1                  |
| 115.0                  | 115.0               | 0.0                 | +1.1                  |
| 114.0                  | 114.0               | 0.0                 | +1.1                  |
| 113.0                  | 113.0               | 0.0                 | +1.1                  |
| 112.0                  | 112.0               | 0.0                 | +1.1                  |
| 111.0                  | 111.0               | 0.0                 | +1.1                  |
| 110.0                  | 110.0               | 0.0                 | +1.1                  |
| 109.0                  | 109.0               | 0.0                 | +1.1                  |
| 108.0                  | 108.0               | 0.0                 | +1.1                  |
| 107.0                  | 107.0               | 0.0                 | +1.1                  |
| 106.0                  | 106.0               | 0.0                 | +1.1                  |
| 105.0                  | 105.0               | 0.0                 | +1.1                  |
| 104.0                  | 104.0               | 0.0                 | +1.1                  |
| 103.0                  | 103.0               | 0.0                 | +1.1                  |
| 102.0                  | 102.0               | 0.0                 | +1.1                  |
| 101.0                  | 101.0               | 0.0                 | +1.1                  |
| 100.0                  | 100.0               | 0.0                 | +1.1                  |
| 99.0                   | 99.0                | 0.0                 | +1.1                  |
| 98.0                   | 98.0                | 0.0                 | +1.1                  |
| 97.0                   | 97.0                | 0.0                 | +1.1                  |
| 96.0                   | 96.0                | 0.0                 | +1.1                  |
| 95.0                   | 95.0                | 0.0                 | +1.1                  |
| 94.0                   | 94.0                | 0.0                 | +1.1                  |
| 93.0                   | 93.0                | 0.0                 | +1.1                  |
| 92.0                   | 92.0                | 0.0                 | +1.1                  |
| 91.0                   | 91.0                | 0.0                 | +1.1                  |
| 90.0                   | 90.0                | 0.0                 | +1.1                  |
| 89.0                   | 89.0                | 0.0                 | +1.1                  |
| 88.0                   | 88.0                | 0.0                 | +1.1                  |
| 87.0                   | 87.0                | 0.0                 | +1.1                  |
| 86.0                   | 86.0                | 0.0                 | +1.1                  |
| 85.0                   | 85.0                | 0.0                 | +1.1                  |
| 84.0                   | 84.0                | 0.0                 | +1.1                  |
| 83.0                   | 83.0                | 0.0                 | +1.1                  |
| 82.0                   | 82.0                | 0.0                 | +1.1                  |
| 81.0                   | 81.0                | 0.0                 | +1.1                  |
| 80.0                   | 80.0                | 0.0                 | +1.1                  |
| 79.0                   | 79.0                | 0.0                 | +1.1                  |
| 78.0                   | 78.0                | 0.0                 | +1.1                  |
| 77.0                   | 77.0                | 0.0                 | +1.1                  |
| 76.0                   | 76.0                | 0.0                 | +1.1                  |
| 75.0                   | 75.0                | 0.0                 | +1.1                  |
| 74.0                   | 74.0                | 0.0                 | +1.1                  |
| 73.0                   | 73.0                | 0.0                 | +1.1                  |
| 72.0                   | 72.0                | 0.0                 | +1.1                  |
| 71.0                   | 71.0                | 0.0                 | +1.1                  |
| 70.0                   | 70.0                | 0.0                 | +1.1                  |
| 69.0                   | 69.0                | 0.0                 | +1.1                  |
| 68.0                   | 68.0                | 0.0                 | +1.1                  |
| 67.0                   | 67.0                | 0.0                 | +1.1                  |
| 66.0                   | 66.0                | 0.0                 | +1.1                  |
| 65.0                   | 65.0                | 0.0                 | +1.1                  |
| 64.0                   | 64.0                | 0.0                 | +1.1                  |
| 63.0                   | 63.0                | 0.0                 | +1.1                  |
| 62.0                   | 62.0                | 0.0                 | +1.1                  |
| 61.0                   | 61.0                | 0.0                 | +1.1                  |
| 60.0                   | 60.0                | 0.0                 | +1.1                  |
| 59.0                   | 59.0                | 0.0                 | +1.1                  |
| 58.0                   | 58.0                | 0.0                 | +1.1                  |
| 57.0                   | 57.0                | 0.0                 | +1.1                  |
| 56.0                   | 56.0                | 0.0                 | +1.1                  |
| 55.0                   | 55.0                | 0.0                 | +1.1                  |
| 54.0                   | 54.0                | 0.0                 | +1.1                  |
| 53.0                   | 53.0                | 0.0                 | +1.1                  |
| 52.0                   | 52.0                | 0.0                 | +1.1                  |
| 51.0                   | 51.0                | 0.0                 | +1.1                  |
| 50.0                   | 50.0                | 0.0                 | +1.1                  |
| 49.0                   | 49.0                | 0.0                 | +1.1                  |
| 48.0                   | 48.0                | 0.0                 | +1.1                  |
| 47.0                   | 47.0                | 0.0                 | +1.1                  |
| 46.0                   | 46.0                | 0.0                 | +1.1                  |
| 45.0                   | 45.0                | 0.0                 | +1.1                  |
| 44.0                   | 44.0                | 0.0                 | +1.1                  |
| 43.0                   | 43.0                | 0.0                 | +1.1                  |
| 42.0                   | 42.0                | 0.0                 | +1.1                  |
| 41.0                   | 41.0                | 0.0                 | +1.1                  |
| 40.0                   | 40.0                | 0.0                 | +1.1                  |
| 39.0                   | 39.0                | 0.0                 | +1.1                  |
| 38.0                   | 38.0                | 0.0                 | +1.1                  |
| 37.0                   | 37.0                | 0.0                 | +1.1                  |
| 36.0                   | 36.0                | 0.0                 | +1.1                  |
| 35.0                   | 35.0                | 0.0                 | +1.1                  |
| 34.0                   | 34.0                | 0.0                 | +1.1                  |
| 33.0                   | 33.0                | 0.0                 | +1.1                  |
| 32.0                   | 32.0                | 0.0                 | +1.1                  |
| 31.0                   | 31.0                | 0.0                 | +1.1                  |
| 30.0                   | 30.0                | 0.0                 | +1.1                  |
| 29.0                   | 29.0                | 0.0                 | +1.1                  |
| 28.0                   | 28.0                | 0.0                 | +1.1                  |
| 27.0                   | 27.0                | 0.0                 | +1.1                  |
| 26.0                   | 26.0                | 0.0                 | +1.1                  |
| 25.0                   | 25.0                | 0.0                 | +1.1                  |
| 24.0                   | 24.0                | 0.0                 | +1.1                  |
| 23.0                   | 23.0                | 0.0                 | +1.1                  |
| 22.0                   | 22.0                | 0.0                 | +1.1                  |
| 21.0                   | 21.0                | 0.0                 | +1.1                  |
| 20.0                   | 20.0                | 0.0                 | +1.1                  |
| 19.0                   | 19.0                | 0.0                 | +1.1                  |
| 18.0                   | 18.0                | 0.0                 | +1.1                  |
| 17.0                   | 17.0                | 0.0                 | +1.1                  |
| 16.0                   | 16.0                | 0.0                 | +1.1                  |
| 15.0                   | 15.0                | 0.0                 | +1.1                  |
| 14.0                   | 14.0                | 0.0                 | +1.1                  |
| 13.0                   | 13.0                | 0.0                 | +1.1                  |
| 12.0                   | 12.0                | 0.0                 | +1.1                  |
| 11.0                   | 11.0                | 0.0                 | +1.1                  |
| 10.0                   | 10.0                | 0.0                 | +1.1                  |
| 9.0                    | 9.0                 | 0.0                 | +1.1                  |
| 8.0                    | 8.0                 | 0.0                 | +1.1                  |
| 7.0                    | 7.0                 | 0.0                 | +1.1                  |
| 6.0                    | 6.0                 | 0.0                 | +1.1                  |
| 5.0                    | 5.0                 | 0.0                 | +1.1                  |
| 4.0                    | 4.0                 | 0.0                 | +1.1                  |
| 3.0                    | 3.0                 | 0.0                 | +1.1                  |
| 2.0                    | 2.0                 | 0.0                 | +1.1                  |
| 1.0                    | 1.0                 | 0.0                 | +1.1                  |

8. Level accuracy including the level range control

| Range | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|-------|------------------------|---------------------|---------------------|-----------------------|
| Auto  | 94.0                   | 94.0                | 0.0                 | +1.1                  |

9. Time burst response

| Time Weighting | Time burst duration, Tr (s) | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|----------------|-----------------------------|------------------------|---------------------|---------------------|-----------------------|
| Imp            | 0.25                        | 100.0                  | 100.0               | 0.0                 | +1.0                  |
|                | 2                           | 115.0                  | 115.0               | 0.0                 | +1.0                  |
| Slow           | 2                           | 100.0                  | 100.0               | 0.0                 | +1.0                  |
|                | 200                         | 100.0                  | 100.0               | 0.0                 | +1.0                  |
| SEL            | 0.25                        | 100.0                  | 100.0               | 0.0                 | +1.0                  |
|                | 2                           | 100.0                  | 100.0               | 0.0                 | +1.0                  |

10. Peak & mean level

| Number of cycle in test signal | Anticipated Value (dB) | Measured Value, Peak (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|--------------------------------|------------------------|---------------------------|---------------------|-----------------------|
| Continuous                     | 133.0                  | 133.0                     | 0.0                 | +3.0                  |
| One                            | 136.0                  | 136.0                     | 0.0                 | +3.0                  |

| Number of cycle in test signal | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|--------------------------------|------------------------|---------------------|---------------------|-----------------------|
| Continuous                     | 133.0                  | 133.0               | 0.0                 | +3.0                  |
| Positive half cycle            | 133.0                  | 133.0               | 0.0                 | +3.0                  |
| Negative half cycle            | 133.0                  | 133.0               | 0.0                 | +3.0                  |

11. Overload indication

| Measured value (dB)     | Deviated Value (dB) | Acceptance Limit (dB) |
|-------------------------|---------------------|-----------------------|
| Positive overload cycle | 94.0                | 94.0                  |
| Negative overload cycle | 94.0                | 94.0                  |
| dB                      | 94.0                | 94.0                  |

12. High level stability

| Frequency Weighting | SLM Display at initial (dB) | SLM Display at final (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|---------------------|-----------------------------|---------------------------|---------------------|-----------------------|
| A-weight            | 137.0                       | 137.0                     | 0.0                 | +0.1                  |

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

End of Calibration Certificate

Calibration Certificate

Equipment : SOUND LEVEL METER  
Model : NL-42 / Microphone UC-2 / Pre-amplifier M9-36  
Serial No : 0504092 / 175177-0572  
ID No : BRK-F50925

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTANAKAN RD. PHATTANAKAN ROAD  
KIAPANG PHATTANAKAN KIAT SUAN LUANG  
RAVANGK (THAILAND)

Location :  
Ambient Temperature :  $25.0 \pm 0.1$  °C  
Pressure :  $1013.25 \pm 0.1$  hPa  
Relative Humidity :  $50.0 \pm 2.0$  %

Received Date : 01 NOVEMBER 2023  
Calibration Date : 05-08 NOVEMBER 2023  
Date of Issue : 14 NOVEMBER 2023

Calibrated by : T. Petch

Approved by : T. Petch  
(Thakul Petchum)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 and may not be reproduced or used in any way without the prior written approval of the head of the calibration laboratory

CP-17025:2017

Continuation of Calibration Certificate

Calibration Method : CP-AC-01  
This equipment was calibrated by based on IEC 61672-2 (2013) Standard for sound level meter (SLM). The SLM had been in Accurately and Electrical signal tests of frequency weighting with Automatic chamber and Reference Sounder test system.

For each result of each item were made by observation of read, instruments display and also with SLM's display

Condition of this result of calibration :

| Item                    | Model    | Serial No. | Check No.  | Exp. Date |
|-------------------------|----------|------------|------------|-----------|
| Waveform Generator      | J3710A   | MY49017876 | 17-0000-33 | 07-FEB-24 |
| Waveform Generator      | J3511B   | MY23302742 | 17-0000-33 | 07-FEB-24 |
| Digital Multimeter      | 34461A   | MY3322004  | 17-0000-33 | 13-MAR-24 |
| Digital Multimeter      | 34461A   | MY33220076 | 17-0000-33 | 13-MAR-24 |
| Digital Multimeter      | 34461A   | MY33220077 | 17-0000-33 | 13-MAR-24 |
| Programmable Attenuator | MAT-1070 | 62100114   | 17-0000-33 | 08-FEB-24 |
| Condenser Microphone    | 4740     | 2077906    | AA-1001-33 | 16-FEB-24 |
| Measuring microphone    | NA-42EAL | 34586995   | AA-1002-33 | 14-FEB-24 |

2. This result of calibration was found accurate as shown on date and place of calibration for this calibration item only  
3. This certificate is available in the information system of our instrument only

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

Summary of Measurement Result :

| Parameter   | Pass | Fail | Uncertainty (dB) | Maximum-permitted uncertainty of measurement (dB) |
|---|------|------|------------------|---|
| 1. Absolute accuracy                                | ✓    | ✓    | 0.2              | N/A   |
| 2. Self-generated noise                             | ✓    | ✓    | 0.2              | N/A   |
| 3. Assumed signal tests of frequency weighting      | ✓    | ✓    | 0.2              | N/A   |
| 4. Frequency and time weightings at 1 kHz           | ✓    | ✓    | 0.2              | N/A   |
| 5. Long-term stability                              | ✓    | ✓    | 0.1              | 0.1   |
| 6. Level accuracy on the reference level range      | ✓    | ✓    | 0.2              | 0.2   |
| 7. Level accuracy including the level range control | ✓    | ✓    | 0.2              | 0.2   |
| 8. Time burst response                              | ✓    | ✓    | 0.2              | 0.2   |
| 9. Peak & mean level                                | ✓    | ✓    | 0.2              | 0.2   |
| 10. Overload indication                             | ✓    | ✓    | 0.1              | 0.1   |
| 11. High level stability                            | ✓    | ✓    | 0.1              | 0.1   |

Note : Peak & mean level for each parameter will be considered together from the acceptance limit and the Maximum-permitted uncertainty of measurement

Result of calibration :

| Reference Acoustic Signal (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|--------------------------------|---------------------|---------------------|-----------------------|
| WATERFALL                      | 93.0                | 0.0                 | +0.3                  |

2. Self-generated noise

2.1 Normal test

| Measured Value (dB) |
|---------------------|
| 14.0                |

2.2 The frequency of the sound level meter was replaced by electrical signal test system

| Frequency Weighting | Measured Value (dB) |
|---------------------|---------------------|
| A-weight            | 13.0                |
| C-weight            | 13.0                |
| Flat                | 13.0                |

3. Assumed signal tests of frequency weighting



Cert. No. : ACL23102  
Job No. : VC07AC0022  
Page : 6 of 8

7. Level linearity on the reference level range

| Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|------------------------|---------------------|----------------------|-----------------------|
| 137.0                  | 137.1               | 0.1                  | +1.1                  |
| 136.0                  | 136.1               | 0.1                  | +1.1                  |
| 135.0                  | 135.1               | 0.1                  | +1.1                  |
| 134.0                  | 134.1               | 0.1                  | +1.1                  |
| 133.0                  | 133.0               | 0.0                  | +1.1                  |
| 132.0                  | 132.0               | 0.0                  | +1.1                  |
| 131.0                  | 131.0               | 0.0                  | +1.1                  |
| 129.9                  | 129.9               | 0.0                  | +1.1                  |
| 124.9                  | 124.6               | -0.3                 | +1.1                  |
| 119.9                  | 119.1               | -0.8                 | +1.1                  |
| 114.9                  | 114.1               | -0.8                 | +1.1                  |
| 109.9                  | 109.1               | -0.8                 | +1.1                  |
| 104.9                  | 104.1               | -0.8                 | +1.1                  |
| 99.9                   | 99.1                | -0.8                 | +1.1                  |
| 94.9                   | 94.0                | -0.9                 | +1.1                  |
| 89.9                   | 89.0                | -0.9                 | +1.1                  |
| 84.9                   | 84.0                | -0.9                 | +1.1                  |
| 79.9                   | 79.0                | -0.9                 | +1.1                  |
| 74.9                   | 74.0                | -0.9                 | +1.1                  |
| 69.9                   | 69.0                | -0.9                 | +1.1                  |
| 64.9                   | 64.0                | -0.9                 | +1.1                  |
| 59.9                   | 59.0                | -0.9                 | +1.1                  |
| 54.9                   | 54.0                | -0.9                 | +1.1                  |
| 49.9                   | 49.0                | -0.9                 | +1.1                  |
| 44.9                   | 44.0                | -0.9                 | +1.1                  |
| 39.9                   | 39.0                | -0.9                 | +1.1                  |
| 34.9                   | 34.0                | -0.9                 | +1.1                  |
| 29.9                   | 29.0                | -0.9                 | +1.1                  |
| 24.9                   | 24.0                | -0.9                 | +1.1                  |
| 19.9                   | 19.0                | -0.9                 | +1.1                  |
| 14.9                   | 14.0                | -0.9                 | +1.1                  |
| 9.9                    | 9.0                 | -0.9                 | +1.1                  |
| 4.9                    | 4.0                 | -0.9                 | +1.1                  |

GP-100 (continued)

T. Petch

Cert. No. : ACL23102  
Job No. : VC07AC0022  
Page : 7 of 8

8. Level linearity including the level range control

| Range | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|-------|------------------------|---------------------|----------------------|-----------------------|
| Auto  | 94.0                   | 94.0                | 0.0                  | +1.1                  |

9. Time burst response

| Time Weighting | Time burst duration, T <sub>b</sub> | Cycle | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|----------------|-------------------------------------|-------|------------------------|---------------------|----------------------|-----------------------|
| Fast           | 0.25                                | 1     | 108.0                  | 107.9               | -0.1                 | +1.5, -0.0            |
|                | 2                                   | 8     | 117.0                  | 117.0               | 0.0                  | +1.0, -2.5            |
|                | 200                                 | 800   | 124.0                  | 124.0               | 0.0                  | +1.0, -2.5            |
| Slow           | 2                                   | 8     | 108.0                  | 108.0               | 0.0                  | +1.5, -0.0            |
|                | 200                                 | 800   | 127.6                  | 127.6               | 0.0                  | +1.0, -2.5            |
|                | 6.25                                | 1     | 99.0                   | 98.8                | -0.2                 | +1.5, -0.0            |
| SEL            | 2                                   | 8     | 108.0                  | 108.0               | 0.0                  | +1.0, -2.5            |
|                | 200                                 | 800   | 124.0                  | 124.0               | 0.0                  | +1.0, -2.5            |

10. Peak C-weight level

| Number of cycle in test signal | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|--------------------------------|------------------------|---------------------|----------------------|-----------------------|
| Continuous                     | 132.0                  | 132.0               | 0.0                  | +2.0                  |
| One                            | 134.4                  | 134.0               | -0.4                 | +2.0                  |

| Number of cycle in test signal | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|--------------------------------|------------------------|---------------------|----------------------|-----------------------|
| Continuous                     | 132.0                  | 132.0               | 0.0                  | +2.0                  |
| Positive half cycle            | 132.4                  | 132.1               | -0.3                 | +2.0                  |
| Negative half cycle            | 132.4                  | 132.1               | -0.3                 | +2.0                  |

GP-100 (continued)

T. Petch

Cert. No. : ACL23102  
Job No. : VC07AC0022  
Page : 8 of 8

11. Overload indicator

| Measured value (dB) | Positive overload cycle | Negative overload cycle | Deviation Value (dB) | Acceptance Limit (dB) |
|---------------------|-------------------------|-------------------------|----------------------|-----------------------|
| 89.9                | 89.9                    | 89.9                    | 0.0                  | +1.5                  |

12. High level stability

| Frequency Weighting | N.M. Display at initial (dB) | N.M. Display at final (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|---------------------|------------------------------|----------------------------|----------------------|-----------------------|
| A-weight            | 127.0                        | 127.0                      | 0.0                  | +0.3                  |

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

End of Calibration Certificate

GP-100 (continued)

T. Petch

SITHIPORN ASSOCIATES CO.,LTD.  
CALIBRATION LABORATORY

55/47/33 Sukhumvit Rd., Bangkok 10110 THAILAND  
Tel: 02-255-0040 Fax: 02-255-1079 e-mail: info@sithiporn.com



Cert. No. : ACL23110  
Page : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NR-40, Microphone CC-01, Preampifier NR-24  
Serial No. : 030919/00002, 00073  
ID No. : BLK, PS0905

Condition As Found :

GOOD

Customer : AUL LABORATORY GROUP (THAI) AND CO.,LTD  
104 PHATHANAKAN-OP PHATHANAKAN ROAD,  
KHAO KHEW PHATHANAKAN, KHU SANITAMANG,  
HANOI, 40250 THAILAND

1 condition :

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

Received Date : 22 SEPTEMBER 2022  
Calibration Date : 16 OCTOBER 2022  
Date of Issue : 19 OCTOBER 2022

Calibrated by : Nattakorn Petchum

Approved by : T. Petch  
( T. Petch )

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard and may not be reproduced or used in any form without approval of the head of Calibration Laboratory

GP-100 (continued)

Cert. No. : ACL23110  
Job No. : VC06AC0101  
Page : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by using an IEC 61672-1 (2013) standard for sound level meter (SLM). The SLM had been in frequency and electrical signal tests of frequency weighting with Acoustic chamber and Reference standard instrument.

For test results of each item were made by observations of each instrument display indicator with SLM's display

Condition of this result of calibration :

1. Reference Standard Instruments

| Instrument             | Model    | Serial No. | Cert. No.   | Exp. Date |
|------------------------|----------|------------|-------------|-----------|
| Waveform Generator     | 33210A   | M14017076  | 17-0009-21  | 01/01/24  |
| Waveform Generator     | 33211B   | MY3202742  | 19-0210-21  | 01/01/24  |
| Digital Multimeter     | 33661A   | MY3202704  | 17-01/01-21 | 13/01/24  |
| Digital Multimeter     | 33661A   | MY3202706  | 17-01/01-21 | 14/01/24  |
| Digital Multimeter     | 33661A   | MY3202725  | 17-01/01-21 | 14/01/24  |
| Programmable Amplifier | MAT-1070 | 02100014   | 19-01/01-21 | 09/01/24  |
| Customer Microphone    | 4020     | 2977960    | AA-1001-21  | 14/01/24  |
| Measuring Amplifier    | NA-420A1 | 34566495   | KA-3000-21  | 14/01/24  |

2. This result of calibration was based on the date and place of calibration for this calibration only.

3. This certificate is available to the immediate users of each instrument only.

1.1 National Institute of Standards (Thailand)

1.2 Electrical Engineering of Scientific and Technological Research (ETSTR)

GP-100 (continued)

T. Petch

Cert. No. : ACL23110  
Job No. : VC06AC0101  
Page : 3 of 8

Result of calibration :

1. Absolute accuracy

| Reference Acoustic Signal (dB) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|--------------------------------|---------------------|----------------|-----------------------|
| 159.00, 98.0                   | 97.9                | -0.1           | +0.3                  |

2. Self-generated noise

| Measured Value |
|----------------|
| L (dB)         |
| 15.0           |

2.2 The description of the sound level meter was accepted by the technical support person

| Frequency Weighting | Measured value (dB) |
|---------------------|---------------------|
| A-weight            | 12.0                |
| C-weight            | 14.0                |
| Flat                | 24.2                |

3. Acoustical signal tests of frequency weightings

Notes: One-third octave response at a level of 94 dB

| Frequency (Hz) | Flat | C-weight | Acceptance Limit |
|----------------|------|----------|------------------|
| 125            | 0.0  | 0.0      | +1.0             |
| 1000           | 0.0  | 0.0      | +1.0             |
| 5000           | 2.5  | 2.5      | +1.0             |

GP-100 (continued)

T. Petch

Cert. No. : ACL23110  
Job No. : VC06AC0101  
Page : 4 of 8

4. Electrical signal tests of frequency weightings

Weighting accuracy response with relative 1 kHz

| Frequency (Hz) | Flat | C-weight | Acceptance Limit |
|----------------|------|----------|------------------|
| 63             | -0.1 | -0.2     | +2.0             |
| 125            | -0.1 | 0.0      | +1.5             |
| 250            | -0.1 | 0.0      | +1.5             |
| 500            | -0.1 | 0.0      | +1.5             |
| 1000           | 0.0  | 0.0      | +1.0             |
| 2000           | 0.0  | 0.0      | +1.0             |
| 4000           | 0.0  | 0.0      | +1.0             |
| 8000           | 0.0  | 0.0      | +1.0             |

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

| Frequency Weighting | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|---------------------|------------------------|---------------------|----------------------|-----------------------|
| A-weight            | 94.0                   | 94.0                | 0.0                  | +0.2                  |
| C-weight            | 94.0                   | 94.0                | 0.0                  | +0.2                  |
| Flat                | 94.0                   | 94.0                | 0.0                  | +0.2                  |

5.2 Time weightings at 1 kHz

| Frequency Weighting | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|---------------------|------------------------|---------------------|----------------------|-----------------------|
| Fast                | 94.0                   | 94.0                | 0.0                  | +0.1                  |
| Slow                | 94.0                   | 94.0                | 0.0                  | +0.1                  |
| Imp                 | 94.0                   | 94.0                | 0.0                  | +0.1                  |

6. Long-term stability

| Frequency Weighting | N.M. Display at initial (dB) | N.M. Display at final (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|---------------------|------------------------------|----------------------------|----------------------|-----------------------|
| A-weight            | 94.0                         | 94.0                       | 0.0                  | +0.1                  |

GP-100 (continued)

T. Petch

Cert. No. : ACL23110  
Job No. : VC06AC0101  
Page : 5 of 8

7. Level linearity on the reference level range

| Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|------------------------|---------------------|----------------------|-----------------------|
| 137.0                  | 137.1               | 0.1                  | +1.1                  |
| 136.0                  | 136.1               | 0.1                  | +1.1                  |
| 135.0                  | 135.1               | 0.1                  | +1.1                  |
| 134.0                  | 134.1               | 0.1                  | +1.1                  |
| 133.0                  | 133.0               | 0.0                  | +1.1                  |
| 132.0                  | 132.0               | 0.0                  | +1.1                  |
| 131.0                  | 131.0               | 0.0                  | +1.1                  |
| 129.9                  | 129.9               | 0.0                  | +1.1                  |
| 124.9                  | 124.6               | -0.3                 | +1.1                  |
| 119.9                  | 119.1               | -0.8                 | +1.1                  |
| 114.9                  | 114.1               | -0.8                 | +1.1                  |
| 109.9                  | 109.1               | -0.8                 | +1.1                  |
| 104.9                  | 104.1               | -0.8                 | +1.1                  |
| 99.9                   | 99.1                | -0.8                 | +1.1                  |
| 94.9                   | 94.0                | -0.9                 | +1.1                  |
| 89.9                   | 89.0                | -0.9                 | +1.1                  |
| 84.9                   | 84.0                | -0.9                 | +1.1                  |
| 79.9                   | 79.0                | -0.9                 | +1.1                  |
| 74.9                   | 74.0                | -0.9                 | +1.1                  |
| 69.9                   | 69.0                | -0.9                 | +1.1                  |
| 64.9                   | 64.0                | -0.9                 | +1.1                  |
| 59.9                   | 59.0                | -0.9                 | +1.1                  |
| 54.9                   | 54.0                | -0.9                 | +1.1                  |
| 49.9                   | 49.0                | -0.9                 | +1.1                  |
| 44.9                   | 44.0                | -0.9                 | +1.1                  |
| 39.9                   | 39.0                | -0.9                 | +1.1                  |
| 34.9                   | 34.0                | -0.9                 | +1.1                  |
| 29.9                   | 29.0                | -0.9                 | +1.1                  |
| 24.9                   | 24.0                | -0.9                 | +1.1                  |
| 19.9                   | 19.0                | -0.9                 | +1.1                  |
| 14.9                   | 14.0                | -0.9                 | +1.1                  |
| 9.9                    | 9.0                 | -0.9                 | +1.1                  |
| 4.9                    | 4.0                 | -0.9                 | +1.1                  |

GP-100 (continued)

T. Petch

Cert. No. : ACL23319  
Job No. : VCA7AC001  
Page : 7 of 8

6. Level linearity including the level range control

| Range | Assigned Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limits (dB) |
|-------|---------------------|---------------------|----------------------|------------------------|
| Auto  | 94.0                | 94.0                | 0.0                  | ±1.1                   |

9. Time based response

| Time     | Time duration, $T_0$ (ms) | Cycle | Assigned Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limits (dB) |
|----------|---------------------------|-------|---------------------|---------------------|----------------------|------------------------|
| Weighing | 0.25                      | 1     | 100.0               | 100.5               | +0.5                 | 1.5; ±0.5              |
|          | 2                         | 9     | 117.0               | 116.9               | -0.1                 | 1.0; ±0.5              |
|          | 200                       | 900   | 134.0               | 134.0               | 0.0                  | ±1.0                   |
|          | 2                         | 9     | 118.0               | 118.0               | 0.0                  | 1.5; ±0.5              |
|          | 200                       | 900   | 127.8               | 127.6               | -0.2                 | ±1.0                   |
|          | 0.25                      | 1     | 99.0                | 98.8                | -0.2                 | 1.5; ±0.5              |
| STL      | 2                         | 9     | 106.0               | 105.9               | -0.1                 | 1.0; ±0.5              |
|          | 200                       | 900   | 128.0               | 128.0               | 0.0                  | ±1.0                   |

10. Peak C-weight level

| Number of cycle in test signal | Assigned Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limits (dB) |
|--------------------------------|---------------------|---------------------|----------------------|------------------------|
| Continuous                     | 133.0               | 133.0               | 0.0                  | ±0.6                   |
| Imp                            | 136.4               | 136.4               | 0.0                  | ±0.6                   |

| Number of cycle in test signal | Assigned Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limits (dB) |
|--------------------------------|---------------------|---------------------|----------------------|------------------------|
| Continuous                     | 133.0               | 133.0               | 0.0                  | ±0.6                   |
| Positive half cycle            | 135.4               | 135.3               | -0.1                 | ±0.6                   |
| Negative half cycle            | 135.4               | 135.3               | -0.1                 | ±0.6                   |

Q1: 100% (Pass)

T. Pich

Cert. No. : ACL23319  
Job No. : VCA7AC001  
Page : 8 of 8

11. Overload indication

| Measured value (dB)     | Deviation Value (dB) | Acceptance Limits (dB) |
|-------------------------|----------------------|------------------------|
| Positive one half cycle | 99.0                 | ±1.5                   |
| Negative one half cycle | 99.0                 | ±1.5                   |

12. High level stability

| Frequency Weighting | SLM Display at Initial (dB) | SLM Display at Final (dB) | Deviation Value (dB) | Acceptance Limits (dB) |
|---------------------|-----------------------------|---------------------------|----------------------|------------------------|
| A-weight            | 137.0                       | 137.0                     | 0.0                  | ±0.2                   |

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor of 2 or any value following calibration providing a level of confidence of approximately 95%.

End of Calibration Certificate

Q1: 100% (Pass)

T. Pich



81/451/5 Sathorn Rd., Bangkok, Bangkok 10120, Thailand  
Tel: 02-2433-4802 Fax: 02-2433-1879 e-mail: cal@calibrationlab.com http://www.calibrationlab.com

Cert. No. : ACL23319  
Job No. : VCA7AC001  
Page : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : B&K  
Model : WL-42 / Microphone UC-42 / Preamplifier M8-24  
Serial No. : 00597336 / 170403 / 72994  
ID No. : BKK, P8099

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40 PHATTHANAKAN ROAD,  
KIWAENG PHATTHANAKAN KHUET SUAN LUANG,  
BANGKOK 10250 THAILAND

Location :  
Ambient Temperature : 23.0 ± 0.3 °C  
Pressure : 1.013 ± 0.3 kPa  
Relative Humidity : 50.0 ± 2.0 %

Received Date : 11 OCTOBER 2022  
Calibration Date : 19-20 OCTOBER 2022  
Date of Issue : 24 OCTOBER 2022

Calibrated by : Natthawee Petchum  
Approved by : T. Pich (Thakul Petchum)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard. Any use or reproduction without the lab's approval will be the user's responsibility at the level of Calibration Laboratory.

Q1: 100% (Pass)

Cert. No. : ACL23319  
Job No. : VCA7AC001  
Page : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by using an IEC 61672-1 (Class B) Standard for sound level meter (SLM). The SLM had been in Acoustic and Electrical signal tests of frequency weighting with Acoustic chamber and Reference Standard Instruments.

For test results of each item were made by direct use of each instrument display and also with SLM's display.

Condition of this result of calibration :

1. Acoustic/Reference Instruments

| Instrument             | Model    | Serial No.  | Exp. Date | Due Date |
|------------------------|----------|-------------|-----------|----------|
| Sound Level Meter      | 31210A   | 94540017018 | 10-02-23  | 04-01-24 |
| Waveform Generator     | 315110   | 9452262742  | 05-02-23  | 07-01-24 |
| Digital Multimeter     | 33441A   | 9453220194  | 11-10-22  | 13-01-24 |
| Digital Multimeter     | 33441A   | 9453220176  | 11-10-22  | 13-01-24 |
| Digital Multimeter     | 33441A   | 9453220173  | 11-10-22  | 13-01-24 |
| Programmable Amplifier | 945110   | 945110114   | 11-01-23  | 03-01-24 |
| Constant Microphone    | 4106     | 297909      | AA-10H-23 | 04-01-24 |
| Measuring Amplifier    | NA-42C-2 | 3456805     | AA-10C-23 | 04-01-24 |

2. The result of calibration was based on the test site and place of calibration for this calibrated item only.

3. This certificate is essential to the international system of units maintained at:  
3.1 National Institute of Standards (NIST).  
3.2 Thailand Institute of Standards and Technology Research (TISTR).

Q1: 100% (Pass)

T. Pich

Cert. No. : ACL23319  
Job No. : VCA7AC001  
Page : 3 of 8

NOISE TEST OF MECHANICAL SIGNAL

| Parameter  | Pass | Fail | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|--|------|------|------------------|---|
| 1. Ambient air sensitivity                           | ✓    | ✗    | 0.2              | N/A   |
| 2. Self-generated noise                              | ✓    | ✗    | 0.2              | N/A   |
| 3. Acoustic signal tests of frequency weighting      |      |      |                  |   |
| 120 Hz   | ✓    | ✗    | 0.3              | 0.6   |
| 1000 Hz  | ✓    | ✗    | 0.3              | 0.6   |
| 5000 Hz  | ✓    | ✗    | 0.3              | 0.7   |
| 4. Electrical signal tests of frequency weighting    |      |      |                  |   |
| For 10 Hz to 4 kHz                                   | ✓    | ✗    | 0.3              | 0.6   |
| For 4 kHz to 10 kHz                                  | ✓    | ✗    | 0.3              | 0.7   |
| For 10 kHz to 20 kHz                                 | ✗    | ✗    | 1.0              |   |
| 5. Frequency and time weighting at 1 kHz             | ✓    | ✗    | 0.2              | 0.3   |
| 6. Long-term stability                               | ✓    | ✗    | 0.1              | 0.1   |
| 7. Level linearity in the reference level range      | ✓    | ✗    | 0.2              | 0.3   |
| 8. Level linearity including the level range control | ✓    | ✗    | 0.2              | 0.3   |
| 9. Free field response                               | ✓    | ✗    | 0.2              | 0.3   |
| 10. Peak C-weight level                              | ✓    | ✗    | 0.2              | 0.3   |
| 11. Overload indication                              | ✓    | ✗    | 0.2              | 0.2   |
| 12. High level stability                             | ✓    | ✗    | 0.1              | 0.1   |

Note: Pass/Fail evaluation for each parameter will be considered together from the acceptance limit and the Maximum permitted uncertainty of measurement.

Q1: 100% (Pass)

T. Pich

Cert. No. : ACL23319  
Job No. : VCA7AC001  
Page : 7 of 8

6. Level linearity including the level range control

| Range | Assigned Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limits (dB) |
|-------|---------------------|---------------------|----------------------|------------------------|
| Auto  | 94.0                | 94.0                | 0.0                  | ±1.1                   |

9. Time based response

| Time      | Time from<br>duration, T <sub>0</sub><br>(ms) | Cycle | Assigned<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits<br>(dB) |
|-----------|---|-------|---------------------------|---------------------------|----------------------------|------------------------------|
| Weighting | 0.25  | 1     | 106.0                     | 107.9                     | +0.1                       | 1.5; ±0.5                    |
|           | 2   | 9     | 117.0                     | 117.0                     | 0.0                        | 1.0; ±0.5                    |
|           | 200   | 900   | 134.0                     | 134.0                     | 0.0                        | ±1.0                         |
| Free      | 2   | 9     | 108.0                     | 108.0                     | 0.0                        | 1.5; ±0.5                    |
|           | 200   | 900   | 127.6                     | 127.6                     | 0.0                        | ±1.0                         |
|           | 0.25  | 1     | 99.0                      | 98.9                      | -0.1                       | 1.5; ±0.5                    |
| STL       | 2   | 9     | 106.0                     | 105.9                     | -0.1                       | 1.0; ±0.5                    |
|           | 200   | 900   | 128.0                     | 128.0                     | 0.0                        | ±1.0                         |

10. Peak C-weight level

| Number of cycle in test signal | Assigned Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limits (dB) |
|--------------------------------|---------------------|---------------------|----------------------|------------------------|
| Continuous                     | 133.0               | 133.0               | 0.0                  | ±0.6                   |
| Imp                            | 136.4               | 136.4               | 0.0                  | ±0.6                   |

| Number of cycle in test signal | Assigned Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limits (dB) |
|--------------------------------|---------------------|---------------------|----------------------|------------------------|
| Continuous                     | 133.0               | 133.0               | 0.0                  | ±0.6                   |
| Positive half cycle            | 135.4               | 135.3               | -0.1                 | ±0.6                   |
| Negative half cycle            | 135.4               | 135.3               | -0.1                 | ±0.6                   |

Q1: 100% (Pass)

T. Pich

T. Pich





**SITHIPORN ASSOCIATES CO., LTD.**  
**CALIBRATION LABORATORY**

Request No.: 21-07053

**10. Peak-Crest level**

| Measured value (dB) | Deviation value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|---------------------|----------------------|-----------------------|------------------|------------------------------------|
| 125.4               | 125.3                | 0.1                   | 0.20             | 0.25                               |
| 124.4               | 124.3                | 0.1                   | 0.20             | 0.25                               |
| 124.4               | 124.3                | 0.1                   | 0.20             | 0.25                               |

**11. Overload indication**

| Measured value (dB) | Deviation value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|---------------------|----------------------|-----------------------|------------------|------------------------------------|
| 125.9               | 125.9                | 0.0                   | 0.3              | 0.25                               |

**12. High level stability**

| Time  | Measured value (dB) | Deviation value (dB) | Acceptance limit (dB) | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|-------|---------------------|----------------------|-----------------------|------------------|------------------------------------|
| Start | 125.9               | 0.0                  | 0.3                   | 0.10             | 0.1                                |
| End   | 125.9               | 0.0                  | 0.3                   | 0.10             | 0.1                                |

Calibrated by: *[Signature]*  
(Mr. Nattawat Supriyach)

Approved by: *[Signature]*  
Industrial Metrology and Testing Service Centre  
No. 101126 012501504012

Date of Calibration: 21 Feb 2024  
Date of Issue: 22 Feb 2024

**SITHIPORN ASSOCIATES CO., LTD.**  
**CALIBRATION LABORATORY**

Request No.: 21-07053

**Calibration Certificate**

Equipment: SOUND CALIBRATOR  
Manufacturer: RION  
Model: SR-7019  
Serial No.: 3417919  
ID No.: RKR 15602

Condition As Found: GOOD

Customer: ALS LABORATORY GROUP (THAILAND) CO., LTD.  
101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
BANGKOK 10250 THAILAND

Location: 101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
BANGKOK 10250 THAILAND

Ambient Temperature: 21.0 ± 0.3 °C  
Pressure: 101.3 ± 0.3 kPa  
Relative Humidity: 50.0 ± 2.0 %

Received Date: 18 JANUARY 2024  
Calibration Date: 20 JANUARY 2024  
Date of Issue: 20 JANUARY 2024

Calibrated by: *[Signature]*  
Nattawat Supriyach

Approved by: *[Signature]*  
(Thailand Pressure)

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**SITHIPORN ASSOCIATES CO., LTD.**  
**CALIBRATION LABORATORY**

Request No.: 21-07053

**Calibration Certificate**

Equipment: SOUND CALIBRATOR  
Manufacturer: RION  
Model: SR-7019  
Serial No.: 3417919  
ID No.: RKR 15602

Condition As Found: GOOD

Customer: ALS LABORATORY GROUP (THAILAND) CO., LTD.  
101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
BANGKOK 10250 THAILAND

Location: 101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
BANGKOK 10250 THAILAND

Ambient Temperature: 21.0 ± 0.3 °C  
Pressure: 101.3 ± 0.3 kPa  
Relative Humidity: 50.0 ± 2.0 %

Received Date: 18 JANUARY 2024  
Calibration Date: 20 JANUARY 2024  
Date of Issue: 20 JANUARY 2024

Calibrated by: *[Signature]*  
Nattawat Supriyach

Approved by: *[Signature]*  
(Thailand Pressure)

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**SITHIPORN ASSOCIATES CO., LTD.**  
**CALIBRATION LABORATORY**

Request No.: 21-07053

**Calibration Certificate**

Equipment: SOUND LEVEL METER  
Manufacturer: RION  
Model: NL-47  
Serial No.: 0257262 / 170431 / 72501  
ID No.: RKR 15602

Condition As Found: GOOD

Customer: ALS LABORATORY GROUP (THAILAND) CO., LTD.  
101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
BANGKOK 10250 THAILAND

Location: 101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
BANGKOK 10250 THAILAND

Ambient Temperature: 21.0 ± 0.3 °C  
Pressure: 101.3 ± 0.3 kPa  
Relative Humidity: 50.0 ± 2.0 %

Received Date: 19 DECEMBER 2023  
Calibration Date: 09-08 JANUARY 2024  
Date of Issue: 09 JANUARY 2024

Calibrated by: *[Signature]*  
Nattawat Supriyach

Approved by: *[Signature]*  
(Thailand Pressure)

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**SITHIPORN ASSOCIATES CO., LTD.**  
**CALIBRATION LABORATORY**

Request No.: 21-07053

**Calibration Certificate**

Equipment: SOUND LEVEL METER  
Manufacturer: RION  
Model: NL-47  
Serial No.: 0257262 / 170431 / 72501  
ID No.: RKR 15602

Condition As Found: GOOD

Customer: ALS LABORATORY GROUP (THAILAND) CO., LTD.  
101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
BANGKOK 10250 THAILAND

Location: 101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
BANGKOK 10250 THAILAND

Ambient Temperature: 21.0 ± 0.3 °C  
Pressure: 101.3 ± 0.3 kPa  
Relative Humidity: 50.0 ± 2.0 %

Received Date: 19 DECEMBER 2023  
Calibration Date: 09-08 JANUARY 2024  
Date of Issue: 09 JANUARY 2024

Calibrated by: *[Signature]*  
Nattawat Supriyach

Approved by: *[Signature]*  
(Thailand Pressure)

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**SITHIPORN ASSOCIATES CO., LTD.**  
**CALIBRATION LABORATORY**

Request No.: 21-07053

**Calibration Certificate**

Equipment: SOUND LEVEL METER  
Manufacturer: RION  
Model: NL-47  
Serial No.: 0257262 / 170431 / 72501  
ID No.: RKR 15602

Condition As Found: GOOD

Customer: ALS LABORATORY GROUP (THAILAND) CO., LTD.  
101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
BANGKOK 10250 THAILAND

Location: 101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
BANGKOK 10250 THAILAND

Ambient Temperature: 21.0 ± 0.3 °C  
Pressure: 101.3 ± 0.3 kPa  
Relative Humidity: 50.0 ± 2.0 %

Received Date: 19 DECEMBER 2023  
Calibration Date: 09-08 JANUARY 2024  
Date of Issue: 09 JANUARY 2024

Calibrated by: *[Signature]*  
Nattawat Supriyach

Approved by: *[Signature]*  
(Thailand Pressure)

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**SITHIPORN ASSOCIATES CO., LTD.**  
**CALIBRATION LABORATORY**

Request No.: 21-07053

**Calibration Certificate**

Equipment: SOUND LEVEL METER  
Manufacturer: RION  
Model: NL-47  
Serial No.: 0257262 / 170431 / 72501  
ID No.: RKR 15602

Condition As Found: GOOD

Customer: ALS LABORATORY GROUP (THAILAND) CO., LTD.  
101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
BANGKOK 10250 THAILAND

Location: 101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
BANGKOK 10250 THAILAND

Ambient Temperature: 21.0 ± 0.3 °C  
Pressure: 101.3 ± 0.3 kPa  
Relative Humidity: 50.0 ± 2.0 %

Received Date: 19 DECEMBER 2023  
Calibration Date: 09-08 JANUARY 2024  
Date of Issue: 09 JANUARY 2024

Calibrated by: *[Signature]*  
Nattawat Supriyach

Approved by: *[Signature]*  
(Thailand Pressure)

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**SITHIPORN ASSOCIATES CO., LTD.**  
**CALIBRATION LABORATORY**

Request No.: 21-07053

**Calibration Certificate**

Equipment: SOUND LEVEL METER  
Manufacturer: RION  
Model: NL-47  
Serial No.: 0257262 / 170431 / 72501  
ID No.: RKR 15602

Condition As Found: GOOD

Customer: ALS LABORATORY GROUP (THAILAND) CO., LTD.  
101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
BANGKOK 10250 THAILAND

Location: 101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
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Relative Humidity: 50.0 ± 2.0 %

Received Date: 19 DECEMBER 2023  
Calibration Date: 09-08 JANUARY 2024  
Date of Issue: 09 JANUARY 2024

Calibrated by: *[Signature]*  
Nattawat Supriyach

Approved by: *[Signature]*  
(Thailand Pressure)

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**SITHIPORN ASSOCIATES CO., LTD.**  
**CALIBRATION LABORATORY**

Request No.: 21-07053

**Calibration Certificate**

Equipment: SOUND LEVEL METER  
Manufacturer: RION  
Model: NL-47  
Serial No.: 0257262 / 170431 / 72501  
ID No.: RKR 15602

Condition As Found: GOOD

Customer: ALS LABORATORY GROUP (THAILAND) CO., LTD.  
101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
BANGKOK 10250 THAILAND

Location: 101 PIATTHANAKAN 40 PIATTHANAKAN ROAD  
KHWANG PIATTHANAKAN KHWANG SUAN LUANG  
BANGKOK 10250 THAILAND

Ambient Temperature: 21.0 ± 0.3 °C  
Pressure: 101.3 ± 0.3 kPa  
Relative Humidity: 50.0 ± 2.0 %

Received Date: 19 DECEMBER 2023  
Calibration Date: 09-08 JANUARY 2024  
Date of Issue: 09 JANUARY 2024

Calibrated by: *[Signature]*  
Nattawat Supriyach

Approved by: *[Signature]*  
(Thailand Pressure)

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## Calibration Certificate

Equipment: SOUND LEVEL METER  
Manufacturer: B&K  
Model: NL 42 / Microphone UC 52 / Pre-amplifier NU 24  
Serial No: 00706001370257007  
ID No: BUK-F50021

Condition As found: (GOOD)

Customer: AEL LABORATORY GROUP (THAILAND) CO., LTD.  
101 PHRA DINAKARN RD. PHATHANAKAN ROAD  
KHUANG NGU PHATHANAKAN, KHUANG SUAN LUANG  
BANGKOK, 10250 THAILAND

Location: /  
Ambient Temperature: (22.0 ± 1.0) °C  
Pressure: (1013.25 ± 1.0) hPa  
Relative Humidity: (50 ± 20) %

Received Date: 22 MAY 2024  
Calibration Date: 15 JUN 2024  
Date of Issue: 16 JUN 2024

Calibrated in: (National Institute of Standards and Technology)

Approved by: *T. Pich*  
(Thakul Pichuan)

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Cert No: A1734207  
Job No: VCM/AC/010  
Page: 1 of 8

Calibration Procedure: (17025)

## Calibration Method:

This equipment was calibrated by following (IEC 61672-1:2013) Standard for sound level meter (SLM).  
The SLM had been tested to determine the electrical signal level of frequency weighting with A-weight, C-weight and Reference Standard frequency.

The test results of two pieces were made by observation of each instrument display and the test results are as follows:

## Condition of this result of calibration:

## Reference Standard Instrument:

| Instrument         | Model  | Serial No  | Cert. No. | Due Date  |
|--------------------|--------|------------|-----------|-----------|
| Reference Standard | 3110A  | M3240-1076 | 11 JUN 24 | 05 JUL 24 |
| Reference Standard | 3151A  | M3240-1076 | 11 JUN 24 | 05 JUL 24 |
| Digital Multimeter | 34461A | M3240-1076 | 11 JUN 24 | 05 JUL 24 |
| Digital Multimeter | 34461A | M3240-1076 | 11 JUN 24 | 05 JUL 24 |
| Digital Multimeter | 34461A | M3240-1076 | 11 JUN 24 | 05 JUL 24 |
| Reference Standard | 34461A | M3240-1076 | 11 JUN 24 | 05 JUL 24 |
| Reference Standard | 34461A | M3240-1076 | 11 JUN 24 | 05 JUL 24 |
| Reference Standard | 34461A | M3240-1076 | 11 JUN 24 | 05 JUL 24 |
| Reference Standard | 34461A | M3240-1076 | 11 JUN 24 | 05 JUL 24 |

2. The result of calibration was found to be in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than as full except with the prior written approval of the head of Calibration Laboratory

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

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

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

Cert No: A1734207  
Job No: VCM/AC/010  
Page: 2 of 8

## Summary of Measurement Result:

| Parameter   | Uncertainty (dB) | Maximum permitted uncertainty (dB) |
|---|------------------|------------------------------------|
| 1. Absolute sensitivity                           | 0.2              | N/A                                |
| 2. Self-generated noise                           | 0.2              | N/A                                |
| 3. Electrical signal level of frequency weighting | 0.2              | N/A                                |
| 4. Electrical signal level of frequency weighting | 0.2              | N/A                                |
| 5. Electrical signal level of frequency weighting | 0.2              | N/A                                |
| 6. Electrical signal level of frequency weighting | 0.2              | N/A                                |
| 7. Level accuracy on the reference level range    | 0.2              | N/A                                |
| 8. Level accuracy on the reference level range    | 0.2              | N/A                                |
| 9. Level accuracy on the reference level range    | 0.2              | N/A                                |
| 10. Level accuracy on the reference level range   | 0.2              | N/A                                |
| 11. Level accuracy on the reference level range   | 0.2              | N/A                                |
| 12. Level accuracy on the reference level range   | 0.2              | N/A                                |



Cert No: A1734207  
Job No: VCM/AC/010  
Page: 1 of 8

## Result of calibration:

## 1. Absolute sensitivity

| Reference Acoustic Signal (dB) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|--------------------------------|---------------------|----------------|-----------------------|
| 94.0 ± 0.4                     | 94.0                | 0.0            | ± 0.2                 |

## 2. Self-generated noise

2.1. Normal test

| Measured Value (dB) |
|---------------------|
| 94.0                |

2.2. The acceptance of the noise level meter was measured by electrical signal level meter

| Frequency (Hz) | Measured Value (dB) |
|----------------|---------------------|
| Weighting      | 94.0                |
| A-weight       | 94.0                |
| C-weight       | 94.0                |
| Flat           | 94.0                |

## 3. Acoustical signal level of frequency weighting

Mean free field acoustic response at a level of 94 dB

| Frequency (Hz) | Flat | A-weight | C-weight | Acceptance Limit (dB) |
|----------------|------|----------|----------|-----------------------|
| 125            | 0.1  | 0.1      | 0.1      | ± 0.5                 |
| 1000           | 0.1  | 0.1      | 0.1      | ± 0.5                 |
| 4000           | 0.1  | 0.1      | 0.1      | ± 0.5                 |



Cert No: A1734207  
Job No: VCM/AC/010  
Page: 2 of 8

## 4. Electrical signal level of frequency weighting

Weighting network response with relative to 1 kHz

| Frequency (Hz) | Flat | A-weight | C-weight | Acceptance Limit (dB) |
|----------------|------|----------|----------|-----------------------|
| 125            | 0.0  | 0.0      | 0.0      | ± 0.5                 |
| 1000           | 0.0  | 0.0      | 0.0      | ± 0.5                 |
| 4000           | 0.0  | 0.0      | 0.0      | ± 0.5                 |
| 10000          | 0.0  | 0.0      | 0.0      | ± 0.5                 |

## 5. Frequency and level weights at 1 kHz

## 5.1 Frequency response at 1 kHz

| Frequency (Hz) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|----------------|---------------------|----------------|-----------------------|
| 125            | 94.0                | 0.0            | ± 0.5                 |
| 1000           | 94.0                | 0.0            | ± 0.5                 |
| 4000           | 94.0                | 0.0            | ± 0.5                 |

## 5.2 Time weighting at 1 kHz

| Frequency (Hz) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|----------------|---------------------|----------------|-----------------------|
| 125            | 94.0                | 0.0            | ± 0.5                 |
| 1000           | 94.0                | 0.0            | ± 0.5                 |
| 4000           | 94.0                | 0.0            | ± 0.5                 |

## 6. Level accuracy

| Frequency (Hz) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|----------------|---------------------|----------------|-----------------------|
| 125            | 94.0                | 0.0            | ± 0.5                 |
| 1000           | 94.0                | 0.0            | ± 0.5                 |
| 4000           | 94.0                | 0.0            | ± 0.5                 |



Cert No: A1734207  
Job No: VCM/AC/010  
Page: 3 of 8

## 7. Level accuracy on the reference level range

| Frequency (Hz) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|----------------|---------------------|----------------|-----------------------|
| 125            | 94.0                | 0.0            | ± 0.5                 |
| 1000           | 94.0                | 0.0            | ± 0.5                 |
| 4000           | 94.0                | 0.0            | ± 0.5                 |
| 10000          | 94.0                | 0.0            | ± 0.5                 |
| 125            | 94.0                | 0.0            | ± 0.5                 |
| 1000           | 94.0                | 0.0            | ± 0.5                 |
| 4000           | 94.0                | 0.0            | ± 0.5                 |
| 10000          | 94.0                | 0.0            | ± 0.5                 |
| 125            | 94.0                | 0.0            | ± 0.5                 |
| 1000           | 94.0                | 0.0            | ± 0.5                 |
| 4000           | 94.0                | 0.0            | ± 0.5                 |
| 10000          | 94.0                | 0.0            | ± 0.5                 |
| 125            | 94.0                | 0.0            | ± 0.5                 |
| 1000           | 94.0                | 0.0            | ± 0.5                 |
| 4000           | 94.0                | 0.0            | ± 0.5                 |
| 10000          | 94.0                | 0.0            | ± 0.5                 |



Cert No: A1734207  
Job No: VCM/AC/010  
Page: 4 of 8

## 8. Level accuracy including the level range control

| Frequency (Hz) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|----------------|---------------------|----------------|-----------------------|
| 125            | 94.0                | 0.0            | ± 0.5                 |
| 1000           | 94.0                | 0.0            | ± 0.5                 |
| 4000           | 94.0                | 0.0            | ± 0.5                 |

## 9. Time band response

| Time (s) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|----------|---------------------|----------------|-----------------------|
| 125      | 94.0                | 0.0            | ± 0.5                 |
| 1000     | 94.0                | 0.0            | ± 0.5                 |
| 4000     | 94.0                | 0.0            | ± 0.5                 |
| 10000    | 94.0                | 0.0            | ± 0.5                 |

## 10. Peak C-weight level

| Frequency (Hz) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|----------------|---------------------|----------------|-----------------------|
| 125            | 94.0                | 0.0            | ± 0.5                 |
| 1000           | 94.0                | 0.0            | ± 0.5                 |
| 4000           | 94.0                | 0.0            | ± 0.5                 |

| Frequency (Hz) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|----------------|---------------------|----------------|-----------------------|
| 125            | 94.0                | 0.0            | ± 0.5                 |
| 1000           | 94.0                | 0.0            | ± 0.5                 |
| 4000           | 94.0                | 0.0            | ± 0.5                 |

*T. Pich*  
(Thakul Pichuan)



Cert No: A1734207  
Job No: VCM/AC/010  
Page: 5 of 8

## 11. Electrical calibration

| Frequency (Hz) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|----------------|---------------------|----------------|-----------------------|
| 125            | 94.0                | 0.0            | ± 0.5                 |
| 1000           | 94.0                | 0.0            | ± 0.5                 |
| 4000           | 94.0                | 0.0            | ± 0.5                 |

## 12. High level stability

| Frequency (Hz) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|----------------|---------------------|----------------|-----------------------|
| 125            | 94.0                | 0.0            | ± 0.5                 |
| 1000           | 94.0                | 0.0            | ± 0.5                 |
| 4000           | 94.0                | 0.0            | ± 0.5                 |

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2

or any value following calibration, showing a level of confidence of approximately 95%

End of Calibration Certificate

*T. Pich*  
(Thakul Pichuan)



Cert No: A1734207  
Job No: VCM/AC/010  
Page: 6 of 8

## Calibration Certificate

Equipment: SOUND LEVEL METER  
Manufacturer: B&K  
Model: NL 42 / Microphone UC 52 / Pre-amplifier NU 24  
Serial No: 00706001370257007  
ID No: BUK-F50021

Condition As found: (GOOD)

Customer: AEL LABORATORY GROUP (THAILAND) CO., LTD.  
101 PHRA DINAKARN RD. PHATHANAKAN ROAD  
KHUANG NGU PHATHANAKAN, KHUANG SUAN LUANG  
BANGKOK, 10250 THAILAND

Location: /  
Ambient Temperature: (22.0 ± 1.0) °C  
Pressure: (1013.25 ± 1.0) hPa  
Relative Humidity: (50 ± 20) %

Received Date: 22 MAY 2024  
Calibration Date: 15 JUN 2024  
Date of Issue: 16 JUN 2024

Calibrated by: (National Institute of Standards and Technology)

Approved by: *T. Pich*  
(Thakul Pichuan)

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# SITHIPORN ASSOCIATES CO., LTD.

## CALIBRATION LABORATORY

401/407 Sukhumvit Road, Bangkok 10110, Thailand  
Tel: 02-6433 8551 Email: sithiporn@innovative.co.th

SITHIPORN  
INNOVATIVE



Cert. No.: ACL24176  
Job No.: VCA7AC0094  
Page: 2 of 8

### Calibration Procedure: CP-AC/01

#### Calibration Method:

This equipment was calibrated by following IEC-61773-3 (2017) Standard for sound level meter (SLM).  
The SLM had been in Acoustic and Electrical signal tests of frequency weighting with Acoustic chamber and Reference Standard Instruments.

The test results of each item were made by observation of each instrument display and also via SLM's display.

#### Condition of this result of calibration:

##### 1. Reference Standard Instruments

| Instrument              | Model    | Serial No. | Cert. No.  | Due Date |
|-------------------------|----------|------------|------------|----------|
| Waveform Generator      | 33210A   | MY10073019 | 11-0009-24 | 01/10/25 |
| Waveform Generator      | 33211B   | MY1230242  | 11-0007-24 | 01/10/25 |
| Digital Multimeter      | 33465A   | MY1229008  | 11-0007-24 | 01/10/25 |
| Digital Multimeter      | 33465A   | MY1229008  | 11-0007-24 | 01/10/25 |
| Digital Multimeter      | 34465A   | MY10073019 | 11-0007-24 | 01/10/25 |
| Programmable Attenuator | MA11870  | 6210014    | 11-0006-24 | 01/10/25 |
| Constant Amplitude      | 4180     | 207990     | AA 1001-24 | 12/12/25 |
| Measuring Amplifier     | NA-424AL | 3454085    | AA 1001-24 | 01/10/25 |

2. The result of each item was found accurate as shown on date and place of calibration / on this calibrated item only.

3. The condition is suitable to the extensive use of each item measured in:

1. National Institute of Metrology (NIM)
2. Thailand Institute of Standards and Technological Research (TISTR)

# SITHIPORN ASSOCIATES CO., LTD.

## CALIBRATION LABORATORY

401/407 Sukhumvit Road, Bangkok 10110, Thailand  
Tel: 02-6433 8551 Email: sithiporn@innovative.co.th

SITHIPORN  
INNOVATIVE



Cert. No.: ACL24176  
Job No.: VCA7AC0094  
Page: 3 of 8

### Summary of Measurement Results:

| Parameter   | 1 (dB) | Maximum permitted uncertainty of measurement (dB) |
|---|--------|---|
| 1. Acoustic sensitivity                             | 0.2    | N/A   |
| 2. Self-generated noise                             | 0.2    | N/A   |
| 3. Acoustic signal tests of frequency weightings    |        |   |
| 125 Hz  | 0.3    | 0.6   |
| 1000 Hz   | 0.3    | 0.6   |
| 8000 Hz   | 0.3    | 0.7   |
| 4. Electrical signal tests of frequency weightings  |        |   |
| For 10 Hz to 4 kHz                                  | 0.3    | 0.6   |
| For 4 kHz to 10 kHz                                 | 0.3    | 0.7   |
| For 10 kHz to 20 kHz                                | 0.2    | 0.6   |
| 5. Frequency and time weighting at 1 kHz            | 0.2    | 0.2   |
| 6. Long-term stability                              | 0.1    | 0.4   |
| 7. Level linearity on the reference level range     | 0.2    | 0.3   |
| 8. Level linearity including the level range extend | 0.2    | 0.3   |
| 9. Linearity response                               | 0.2    | 0.2   |
| 10. Peak-C-weight level                             | 0.2    | 0.3   |
| 11. Overload indication                             | 0.2    | 0.2   |
| 12. High-level stability                            | 0.1    | 0.4   |

# SITHIPORN ASSOCIATES CO., LTD.

## CALIBRATION LABORATORY

401/407 Sukhumvit Road, Bangkok 10110, Thailand  
Tel: 02-6433 8551 Email: sithiporn@innovative.co.th

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### Result of calibration:

#### 1. Absolute sensitivity

| Reference Acoustic signal (dB) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|--------------------------------|---------------------|----------------|-----------------------|
| 93.0 (93.0)                    | 93.0                | 0.0            | ±0.5                  |

#### 2. Self-generated noise

| Measured Value (dB) | Acceptance Limit (dB) |
|---------------------|-----------------------|
| 10.0                | ±0.5                  |

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

| Frequency weighting (dB) | Measured value (dB) | Acceptance Limit (dB) |
|--------------------------|---------------------|-----------------------|
| A-weighting              | 12.0                | ±0.5                  |
| C-weighting              | 15.0                | ±0.5                  |
| Z-weighting              | 20.0                | ±0.5                  |

#### 3. Acoustic signal tests of frequency weightings

More than 10 dB acoustic response at a level of 94 dB

| Frequency (Hz) | Deviation from reference frequency weighting response (dB) | Acceptance Limit (dB) |
|----------------|--|-----------------------|
| 125            | -0.3   | ±0.5                  |
| 1000           | -0.1   | ±0.5                  |
| 8000           | -0.1   | ±0.5                  |

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

Weighting network response with relative to 1 kHz

| Frequency (Hz) | Flat | C-weighting | A-weighting | Acceptance Limit (dB) |
|----------------|------|-------------|-------------|-----------------------|
| 80             | 0.0  | -0.1        | -0.1        | ±0.5                  |
| 125            | 0.0  | -0.1        | -0.1        | ±0.5                  |
| 250            | 0.0  | -0.1        | -0.1        | ±0.5                  |
| 500            | 0.0  | -0.1        | -0.1        | ±0.5                  |
| 1000           | 0.0  | 0.0         | 0.0         | ±0.5                  |
| 2000           | 0.0  | 0.0         | 0.0         | ±0.5                  |
| 4000           | 0.0  | 0.0         | 0.0         | ±0.5                  |
| 8000           | 0.0  | 0.0         | 0.0         | ±0.5                  |

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

| Frequency weighting (dB) | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|--------------------------|------------------------|---------------------|----------------------|-----------------------|
| A-weighting              | 94.0                   | 94.0                | 0.0                  | ±0.5                  |
| C-weighting              | 96.0                   | 96.0                | 0.0                  | ±0.5                  |
| Z-weighting              | 98.0                   | 98.0                | 0.0                  | ±0.5                  |

#### 5.2 Time weighting at 1 kHz

| Frequency weighting (dB) | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|--------------------------|------------------------|---------------------|----------------------|-----------------------|
| Fast                     | 94.0                   | 94.0                | 0.0                  | ±0.5                  |
| Slow                     | 94.0                   | 94.0                | 0.0                  | ±0.5                  |
| Long                     | 94.0                   | 94.0                | 0.0                  | ±0.5                  |

#### 6. Long-term stability

| Frequency weighting (dB) | SLM Display at first (dB) | SLM Display at final (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|--------------------------|---------------------------|---------------------------|----------------------|-----------------------|
| A-weighting              | 94.0                      | 94.0                      | 0.0                  | ±0.5                  |

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

| Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|------------------------|---------------------|----------------------|-----------------------|
| 137.0                  | 137.0               | 0.0                  | ±0.5                  |
| 136.0                  | 136.0               | 0.0                  | ±0.5                  |
| 135.0                  | 135.0               | 0.0                  | ±0.5                  |
| 134.0                  | 134.0               | 0.0                  | ±0.5                  |
| 133.0                  | 133.0               | 0.0                  | ±0.5                  |
| 132.0                  | 132.0               | 0.0                  | ±0.5                  |
| 131.0                  | 131.0               | 0.0                  | ±0.5                  |
| 130.0                  | 130.0               | 0.0                  | ±0.5                  |
| 129.0                  | 129.0               | 0.0                  | ±0.5                  |
| 128.0                  | 128.0               | 0.0                  | ±0.5                  |
| 127.0                  | 127.0               | 0.0                  | ±0.5                  |
| 126.0                  | 126.0               | 0.0                  | ±0.5                  |
| 125.0                  | 125.0               | 0.0                  | ±0.5                  |
| 124.0                  | 124.0               | 0.0                  | ±0.5                  |
| 123.0                  | 123.0               | 0.0                  | ±0.5                  |
| 122.0                  | 122.0               | 0.0                  | ±0.5                  |
| 121.0                  | 121.0               | 0.0                  | ±0.5                  |
| 120.0                  | 120.0               | 0.0                  | ±0.5                  |
| 119.0                  | 119.0               | 0.0                  | ±0.5                  |
| 118.0                  | 118.0               | 0.0                  | ±0.5                  |
| 117.0                  | 117.0               | 0.0                  | ±0.5                  |
| 116.0                  | 116.0               | 0.0                  | ±0.5                  |
| 115.0                  | 115.0               | 0.0                  | ±0.5                  |
| 114.0                  | 114.0               | 0.0                  | ±0.5                  |
| 113.0                  | 113.0               | 0.0                  | ±0.5                  |
| 112.0                  | 112.0               | 0.0                  | ±0.5                  |
| 111.0                  | 111.0               | 0.0                  | ±0.5                  |
| 110.0                  | 110.0               | 0.0                  | ±0.5                  |
| 109.0                  | 109.0               | 0.0                  | ±0.5                  |
| 108.0                  | 108.0               | 0.0                  | ±0.5                  |
| 107.0                  | 107.0               | 0.0                  | ±0.5                  |
| 106.0                  | 106.0               | 0.0                  | ±0.5                  |
| 105.0                  | 105.0               | 0.0                  | ±0.5                  |
| 104.0                  | 104.0               | 0.0                  | ±0.5                  |
| 103.0                  | 103.0               | 0.0                  | ±0.5                  |
| 102.0                  | 102.0               | 0.0                  | ±0.5                  |
| 101.0                  | 101.0               | 0.0                  | ±0.5                  |
| 100.0                  | 100.0               | 0.0                  | ±0.5                  |
| 99.0                   | 99.0                | 0.0                  | ±0.5                  |
| 98.0                   | 98.0                | 0.0                  | ±0.5                  |
| 97.0                   | 97.0                | 0.0                  | ±0.5                  |
| 96.0                   | 96.0                | 0.0                  | ±0.5                  |
| 95.0                   | 95.0                | 0.0                  | ±0.5                  |
| 94.0                   | 94.0                | 0.0                  | ±0.5                  |
| 93.0                   | 93.0                | 0.0                  | ±0.5                  |
| 92.0                   | 92.0                | 0.0                  | ±0.5                  |
| 91.0                   | 91.0                | 0.0                  | ±0.5                  |
| 90.0                   | 90.0                | 0.0                  | ±0.5                  |
| 89.0                   | 89.0                | 0.0                  | ±0.5                  |
| 88.0                   | 88.0                | 0.0                  | ±0.5                  |
| 87.0                   | 87.0                | 0.0                  | ±0.5                  |
| 86.0                   | 86.0                | 0.0                  | ±0.5                  |
| 85.0                   | 85.0                | 0.0                  | ±0.5                  |
| 84.0                   | 84.0                | 0.0                  | ±0.5                  |
| 83.0                   | 83.0                | 0.0                  | ±0.5                  |
| 82.0                   | 82.0                | 0.0                  | ±0.5                  |
| 81.0                   | 81.0                | 0.0                  | ±0.5                  |
| 80.0                   | 80.0                | 0.0                  | ±0.5                  |
| 79.0                   | 79.0                | 0.0                  | ±0.5                  |
| 78.0                   | 78.0                | 0.0                  | ±0.5                  |
| 77.0                   | 77.0                | 0.0                  | ±0.5                  |
| 76.0                   | 76.0                | 0.0                  | ±0.5                  |
| 75.0                   | 75.0                | 0.0                  | ±0.5                  |
| 74.0                   | 74.0                | 0.0                  | ±0.5                  |
| 73.0                   | 73.0                | 0.0                  | ±0.5                  |
| 72.0                   | 72.0                | 0.0                  | ±0.5                  |
| 71.0                   | 71.0                | 0.0                  | ±0.5                  |
| 70.0                   | 70.0                | 0.0                  | ±0.5                  |
| 69.0                   | 69.0                | 0.0                  | ±0.5                  |
| 68.0                   | 68.0                | 0.0                  | ±0.5                  |
| 67.0                   | 67.0                | 0.0                  | ±0.5                  |
| 66.0                   | 66.0                | 0.0                  | ±0.5                  |
| 65.0                   | 65.0                | 0.0                  | ±0.5                  |
| 64.0                   | 64.0                | 0.0                  | ±0.5                  |
| 63.0                   | 63.0                | 0.0                  | ±0.5                  |
| 62.0                   | 62.0                | 0.0                  | ±0.5                  |
| 61.0                   | 61.0                | 0.0                  | ±0.5                  |
| 60.0                   | 60.0                | 0.0                  | ±0.5                  |
| 59.0                   | 59.0                | 0.0                  | ±0.5                  |
| 58.0                   | 58.0                | 0.0                  | ±0.5                  |
| 57.0                   | 57.0                | 0.0                  | ±0.5                  |
| 56.0                   | 56.0                | 0.0                  | ±0.5                  |
| 55.0                   | 55.0                | 0.0                  | ±0.5                  |
| 54.0                   | 54.0                | 0.0                  | ±0.5                  |
| 53.0                   | 53.0                | 0.0                  | ±0.5                  |
| 52.0                   | 52.0                | 0.0                  | ±0.5                  |
| 51.0                   | 51.0                | 0.0                  | ±0.5                  |
| 50.0                   | 50.0                | 0.0                  | ±0.5                  |
| 49.0                   | 49.0                | 0.0                  | ±0.5                  |
| 48.0                   | 48.0                | 0.0                  | ±0.5                  |
| 47.0                   | 47.0                | 0.0                  | ±0.5                  |
| 46.0                   | 46.0                | 0.0                  | ±0.5                  |
| 45.0                   | 45.0                | 0.0                  | ±0.5                  |
| 44.0                   | 44.0                | 0.0                  | ±0.5                  |
| 43.0                   | 43.0                | 0.0                  | ±0.5                  |
| 42.0                   | 42.0                | 0.0                  | ±0.5                  |
| 41.0                   | 41.0                | 0.0                  | ±0.5                  |
| 40.0                   | 40.0                | 0.0                  | ±0.5                  |
| 39.0                   | 39.0                | 0.0                  | ±0.5                  |
| 38.0                   | 38.0                | 0.0                  | ±0.5                  |
| 37.0                   | 37.0                | 0.0                  | ±0.5                  |
| 36.0                   | 36.0                | 0.0                  | ±0.5                  |
| 35.0                   | 35.0                | 0.0                  | ±0.5                  |
| 34.0                   | 34.0                | 0.0                  | ±0.5                  |
| 33.0                   | 33.0                | 0.0                  | ±0.5                  |
| 32.0                   | 32.0                | 0.0                  | ±0.5                  |
| 31.0                   | 31.0                | 0.0                  | ±0.5                  |
| 30.0                   | 30.0                | 0.0                  | ±0.5                  |
| 29.0                   | 29.0                | 0.0                  | ±0.5                  |
| 28.0                   | 28.0                | 0.0                  | ±0.5                  |
| 27.0                   | 27.0                | 0.0                  | ±0.5                  |
| 26.0                   | 26.0                | 0.0                  | ±0.5                  |
| 25.0                   | 25.0                | 0.0                  | ±0.5                  |

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

| Range | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|-------|------------------------|---------------------|----------------------|-----------------------|
| Audio | 94.0                   | 94.0                | 0.0                  | ±0.5                  |

#### 9. Time burst response

| Time weighting | Time duration (s) | Cycle | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|----------------|-------------------|-------|------------------------|---------------------|----------------------|-----------------------|
| Fast           | 0.25              | 1     | 100.0                  | 100.0               | 0.0                  | ±0.5                  |
| Slow           | 200               | 800   | 100.0                  | 100.0               | 0.0                  | ±0.5                  |
| Long           | 2                 | 8     | 100.0                  | 100.0               | 0.0                  | ±0.5                  |
| SEI            | 200               | 800   | 100.0                  | 100.0               | 0.0                  | ±0.5                  |
|                | 0.25              | 1     | 95.0                   | 95.0                | 0.0                  | ±0.5                  |
|                | 2                 | 8     | 100.0                  | 100.0               | 0.0                  | ±0.5                  |
|                | 200               | 800   | 100.0                  | 100.0               | 0.0                  | ±0.5                  |

#### 10. Peak-C-weight level

| Number of cycle | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|-----------------|------------------------|---------------------|----------------------|-----------------------|
| Fast signal     | 110.0                  | 110.0               | 0.0                  | ±0.5                  |
| Continuous      | 110.0                  | 110.0               | 0.0                  | ±0.5                  |
| One             | 110.0                  | 110.0               | 0.0                  | ±0.5                  |

| Number of cycle     | Anticipated Value (dB) | Measured Value (dB) | Deviation Value (dB) | Acceptance Limit (dB) |
|---------------------|------------------------|---------------------|----------------------|-----------------------|
| Fast signal         | 110.0                  | 110.0               | 0.0                  | ±0.5                  |
| Continuous          | 110.0                  | 110.0               | 0.0                  | ±0.5                  |
| Positive half cycle | 110.0                  | 110.0               | 0.0                  | ±0.5                  |
| Negative half cycle | 110.0                  | 110.0               | 0.0                  | ±0.5                  |

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| Frequency | Deviation from nominal frequency (Hz) | Uncertainty | Acceptance |
|-----------|---------------------------------------|-------------|------------|
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |

| Frequency | Deviation from nominal frequency (Hz) | Uncertainty | Acceptance |
|-----------|---------------------------------------|-------------|------------|
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |

| Frequency | Deviation from nominal frequency (Hz) | Uncertainty | Acceptance |
|-----------|---------------------------------------|-------------|------------|
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |

The measurement is in accordance with the requirements of ISO/IEC 17025:2017, clause 7.6.1. The measurement is in accordance with the requirements of ISO/IEC 17025:2017, clause 7.6.2.

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| Frequency | Deviation from nominal frequency (Hz) | Uncertainty | Acceptance |
|-----------|---------------------------------------|-------------|------------|
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |

| Frequency | Deviation from nominal frequency (Hz) | Uncertainty | Acceptance |
|-----------|---------------------------------------|-------------|------------|
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |

The measurement is in accordance with the requirements of ISO/IEC 17025:2017, clause 7.6.1. The measurement is in accordance with the requirements of ISO/IEC 17025:2017, clause 7.6.2.

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| Frequency | Deviation from nominal frequency (Hz) | Uncertainty | Acceptance |
|-----------|---------------------------------------|-------------|------------|
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |

| Frequency | Deviation from nominal frequency (Hz) | Uncertainty | Acceptance |
|-----------|---------------------------------------|-------------|------------|
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |

| Frequency | Deviation from nominal frequency (Hz) | Uncertainty | Acceptance |
|-----------|---------------------------------------|-------------|------------|
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |

The measurement is in accordance with the requirements of ISO/IEC 17025:2017, clause 7.6.1. The measurement is in accordance with the requirements of ISO/IEC 17025:2017, clause 7.6.2.

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| Frequency | Deviation from nominal frequency (Hz) | Uncertainty | Acceptance |
|-----------|---------------------------------------|-------------|------------|
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |

| Frequency | Deviation from nominal frequency (Hz) | Uncertainty | Acceptance |
|-----------|---------------------------------------|-------------|------------|
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |

| Parameter                     | Measurement | Uncertainty | Acceptance |
|-------------------------------|-------------|-------------|------------|
| 1. Absolute sensitivity       | 0.00        | 0.00        | 0.00       |
| 2. Self-generated noise       | 0.00        | 0.00        | 0.00       |
| 3. Frequency and time weights | 0.00        | 0.00        | 0.00       |
| 4. Level uncertainty          | 0.00        | 0.00        | 0.00       |
| 5. Level uncertainty          | 0.00        | 0.00        | 0.00       |
| 6. Level uncertainty          | 0.00        | 0.00        | 0.00       |
| 7. Level uncertainty          | 0.00        | 0.00        | 0.00       |
| 8. Level uncertainty          | 0.00        | 0.00        | 0.00       |
| 9. Level uncertainty          | 0.00        | 0.00        | 0.00       |
| 10. Level uncertainty         | 0.00        | 0.00        | 0.00       |
| 11. Level uncertainty         | 0.00        | 0.00        | 0.00       |
| 12. Level uncertainty         | 0.00        | 0.00        | 0.00       |

The measurement is in accordance with the requirements of ISO/IEC 17025:2017, clause 7.6.1. The measurement is in accordance with the requirements of ISO/IEC 17025:2017, clause 7.6.2.

Cert. No. 143.24175  
Lab. No. 143.24175

## Calibration Certificate

Equipment: WINDLEVER M21A  
Manufacturer: RION  
Model: NI-42 / Microphone NI-42 / Piezoelectric NI-42  
Serial No: 00100000 / 130054 / 100000  
ID No: 00000000

Condition As Found: GOOD

Customer: JLS LABORATORY GROUP (THAILAND) CO., LTD.  
100 PHATTHANAKAN 40 PHATTHANAKAN 40/40  
RUEANG PHATTHANAKAN 40/40 PHATTHANAKAN 40/40  
BANGKOK, 10250, THAILAND

Location: 1.230 x 1.3  
Ambient Temperature: 1.230 x 1.3  
Pressure: 1.230 x 1.3  
Relative Humidity: 1.230 x 1.3

Revised Date: 22 MAY 2024  
Calibration Date: 22 JUN 2024  
Date of Issue: 14 JUL 2024

Calibrated by: Suthakorn Pongmanee

Approved by: T. Rattanapichet

This certificate is issued in accordance with the requirements of ISO/IEC 17025:2017, clause 7.6.1. The measurement is in accordance with the requirements of ISO/IEC 17025:2017, clause 7.6.2.

Cert. No. 143.24175  
Lab. No. 143.24175

## Calibration Procedure: CP-AC-01

Calibration Method: The equipment was calibrated by following the NI-42 (41672-1) (2013) Standard for wind level meter (SI M). The SLM had been used to measure and electrical signal tests of frequency weighting with Amplitude, channel and Reference Standard, instrument.

For more details of each item were made by observation of each instrument display and also with SI M display.

## Condition of this result of calibration:

| Instrument             | Model     | Serial No. | Cert. No.   | Due Date  |
|------------------------|-----------|------------|-------------|-----------|
| Waveform Generator     | 33210A    | MY2401706  | 143-0009-24 | 05 JUN 25 |
| Waveform Generator     | 33210A    | MY2402742  | 143-0007-24 | 04 JUN 25 |
| Signal Monitor         | 33461A    | MY2202014  | 143-0021-24 | 11 JUN 25 |
| Digital Multimeter     | 34461A    | MY2202014  | 143-0021-24 | 11 JUN 25 |
| Digital Multimeter     | 34461A    | MY2202014  | 143-0021-24 | 11 JUN 25 |
| Programmable Amplifier | NIAT-1070 | 02100114   | 143-0008-24 | 05 JUN 25 |
| Condenser Microphone   | 1180      | 207760     | AA 1001-24  | 12 JUN 25 |
| Measuring Amplifier    | NA 4700A  | 3456000    | 143-0009-24 | 05 JUN 25 |

2. This result of calibration was found accurate as shown on this and place of calibration for the calibrated item only.  
3. The certificate is transferable to the international system of units and measurement.  
4. National Institute of Standards (NIST)  
5. United States of America and International Research (NIST)

Cert. No. 143.24175  
Lab. No. 143.24175

## Summary of Measurement Results

| Parameter                     | Uncertainty | Measurement | Acceptance |
|-------------------------------|-------------|-------------|------------|
| 1. Absolute sensitivity       | 0.00        | 0.00        | 0.00       |
| 2. Self-generated noise       | 0.00        | 0.00        | 0.00       |
| 3. Frequency and time weights | 0.00        | 0.00        | 0.00       |
| 4. Level uncertainty          | 0.00        | 0.00        | 0.00       |
| 5. Level uncertainty          | 0.00        | 0.00        | 0.00       |
| 6. Level uncertainty          | 0.00        | 0.00        | 0.00       |
| 7. Level uncertainty          | 0.00        | 0.00        | 0.00       |
| 8. Level uncertainty          | 0.00        | 0.00        | 0.00       |
| 9. Level uncertainty          | 0.00        | 0.00        | 0.00       |
| 10. Level uncertainty         | 0.00        | 0.00        | 0.00       |
| 11. Level uncertainty         | 0.00        | 0.00        | 0.00       |
| 12. Level uncertainty         | 0.00        | 0.00        | 0.00       |

T. Rattanapichet

Cert. No. 143.24175  
Lab. No. 143.24175

## Result of calibration:

| Reference               | Measured Value | Deviation | Acceptance |
|-------------------------|----------------|-----------|------------|
| 1. Absolute sensitivity | 0.00           | 0.00      | 0.00       |
| 2. Self-generated noise | 0.00           | 0.00      | 0.00       |

| Frequency | Measured Value | Deviation | Acceptance |
|-----------|----------------|-----------|------------|
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |

| Frequency | Measured Value | Deviation | Acceptance |
|-----------|----------------|-----------|------------|
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |

| Frequency | Measured Value | Deviation | Acceptance |
|-----------|----------------|-----------|------------|
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |
| 100 Hz    | 0.00           | 0.00      | 0.00       |

T. Rattanapichet

Cert. No. 143.24175  
Lab. No. 143.24175

## Electrical signal tests of frequency weightings

| Frequency | Deviation from nominal frequency (Hz) | Uncertainty | Acceptance |
|-----------|---------------------------------------|-------------|------------|
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |

| Frequency | Deviation from nominal frequency (Hz) | Uncertainty | Acceptance |
|-----------|---------------------------------------|-------------|------------|
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |
| 100 Hz    | 0.00                                  | 0.00        | 0.00       |

|     |      |      |      |      |
|-----|------|------|------|------|
| 100 | 99.9 | 99.9 | 99.9 | 99.9 |
|-----|------|------|------|------|

5.2 Time weighting at 1 kHz

| Frequency<br>Weighting | Adjusted<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviated<br>Value<br>(dB) | Acceptance<br>Limits<br>(dB) |
|------------------------|---------------------------|---------------------------|---------------------------|------------------------------|
| Fast                   | 99.9                      | 99.9                      | 0.0                       | 99.9                         |
| Slow                   | 99.9                      | 99.9                      | 0.0                       | 99.9                         |





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

| Range | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|-------|------------------------|---------------------|---------------------|------------------------|
| Audio | 94.0                   | 94.0                | 0.0                 | ±1.5                   |

#### 9. Time burst response

| Time | Time burst duration, Th (ms) | Cycle | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|------|------------------------------|-------|------------------------|---------------------|---------------------|------------------------|
| Flat | 0.25                         | 2     | 108.5                  | 107.9               | -0.6                | 1.2 - 5.0              |
|      | 2                            | 8     | 117.8                  | 117.6               | -0.2                | 1.6 - 2.5              |
| Sine | 200                          | 800   | 134.0                  | 134.0               | 0.0                 | ±1.0                   |
|      | 200                          | 800   | 127.8                  | 127.8               | 0.0                 | ±1.0                   |
| SPL  | 0.25                         | 2     | 99.5                   | 99.9                | +0.4                | 1.2 - 5.0              |
|      | 2                            | 8     | 108.0                  | 108.0               | 0.0                 | 1.6 - 2.5              |
|      | 200                          | 800   | 128.0                  | 128.1               | +0.1                | ±1.0                   |

#### 10. Peak C-weight level

| Number of cycle in sine signal | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|--------------------------------|------------------------|---------------------|---------------------|------------------------|
| Continuous                     | 133.0                  | 133.0               | 0.0                 | ±1.0                   |
| One                            | 136.4                  | 135.8               | -0.6                | ±1.0                   |

| Number of cycle in sine signal | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|--------------------------------|------------------------|---------------------|---------------------|------------------------|
| Continuous                     | 133.0                  | 132.8               | -0.2                | ±2.0                   |
| Positive half cycle            | 135.8                  | 135.1               | -0.7                | ±2.0                   |
| Negative half cycle            | 135.8                  | 135.1               | -0.7                | ±2.0                   |

T. Petch

#### 11. Overload indication

| Measured value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---------------------|---------------------|------------------------|
| Positive            | 108.5               | ±1.5                   |
| Negative            | 108.5               | ±1.5                   |

#### 12. High level stability

| Frequency Weighting | S.M Display at start (dB) | S.M Display at final (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---------------------|---------------------------|---------------------------|---------------------|------------------------|
| A-weight            | 132.0                     | 132.0                     | 0.0                 | ±0.5                   |

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

End of Calibration Certificate

T. Petch

### Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NL-42 / Measurement LC 32 / Prescription N11 24  
Serial No : 0070637 / 07702 / 00906  
ID No : HNA 156201

Condition As Found : OK

Customer : ALS LABORATORY GROUP (THAI) CO., LTD.  
104 PHATTHANAKAN 40 PHATTHANAKAN ROAD  
KIRIN-NG PHATTHANAKAN KHUET SAN LUANG  
BANGKOK 10250 THAILAND

Location :  
Ambient Temperature : 23.0 ± 0.3 °C  
Pressure : 1013.3 ± 0.3 hPa  
Relative Humidity : 50.0 ± 2.0 %

Received Date : 23 MAY 2024  
Calibration Date : 12 JUNE 2024  
Date of Issue : 14 JUNE 2024

Calibrated by : T. Petch

Approved by : T. Petch  
(Thamkol Petchum)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced either in full or in part without the prior written approval of the issuing laboratory

#### Calibration Procedure : ZP-AC-08

#### Calibration Method :

The equipment was calibrated by follow on IEC 61672-2 (2012) Standard for sound level meter (SLM). The SLM had been to Acoustical and Electrical signal level at frequency weighting with A-weight, C-weight and Reference Standard Instruments.

For main results of each item was made by observation of read (Instrument display) and also with SLM's display

#### Condition of this result of calibration :

##### 1. Reference Standard Instruments

| Instrument              | Model     | Serial No. | Cert. No.      | Due Date   |
|-------------------------|-----------|------------|----------------|------------|
| Waveform Generator      | 3101DS    | MY54013076 | 13-0409-24     | 26 JUNE 25 |
| Waveform Generator      | 21711B    | MY52902745 | EF-0407-24     | 26 JUNE 25 |
| Digital Multimeter      | 33461A    | MY53200764 | ELE-RP-21-0207 | 13 JUNE 25 |
| Digital Multimeter      | 33461A    | MY53200765 | ELE-RP-20-0207 | 13 JUNE 25 |
| Digital Multimeter      | 34461A    | MY50424273 | ELE-RP-22-0207 | 13 JUNE 25 |
| Programmable Attenuator | MAT 1870  | 62100114   | EF-0008-24     | 05 JULY 25 |
| Condenser Microphone    | 4100      | 2670960    | AA-0801-24     | 12 JULY 25 |
| Measuring Amplifier     | N.A-231AJ | 34560495   | AA-3001-24     | 05 JULY 25 |

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

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

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

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#### Summary of Measurement Result

| Parameter  | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|--|------------------|---|
| 1. Absolute sensitivity                              | 0.2              | N/A   |
| 2. Self-generated noise                              | 0.2              | N/A   |
| 3. Acoustical signal level of frequency weightings   |                  |   |
| 125 Hz   | 0.3              | 0.6   |
| 250 Hz   | 0.3              | 0.6   |
| 500 Hz   | 0.3              | 0.7   |
| 4. Electrical signal level of frequency weightings   |                  |   |
| Flat 10 Hz to 10 kHz                                 | 0.2              | 0.6   |
| Flat 10 Hz to 10 kHz                                 | 0.2              | 0.7   |
| Flat 10 Hz to 20 kHz                                 | 0.2              | 0.7   |
| 5. Frequency and time weightings at 1 kHz            | 0.2              | 0.2   |
| 6. Fast - term stability                             | 0.1              | 0.1   |
| 7. Level deviation on the reference level range      | 0.2              | 0.3   |
| 8. Level deviation including the level range control | 0.2              | 0.3   |
| 9. Time burst response                               | 0.2              | 0.3   |
| 10. Peak C-weight level                              | 0.2              | 0.2   |
| 11. Overload indication                              | 0.2              | 0.2   |
| 12. High level stability                             | 0.1              | 0.1   |

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#### Result of calibration :

##### 1. Absolute sensitivity

| Reference Acoustic signal (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|--------------------------------|---------------------|---------------------|------------------------|
| 93.9 (93.94)                   | 93.9                | 0.0                 | ±0.3                   |

##### 2. Self-generated noise

| Measured Value (dB) |
|---------------------|
| 13.3                |

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

| Frequency Weighting | Measured Value (dB) |
|---------------------|---------------------|
| A-weight            | 12.8                |
| C-weight            | 13.8                |
| Flat                | 24.6                |

##### 3. Acoustical signal level of frequency weightings

Mean free field acoustic response at a level of 94 dB

| Frequency (Hz) | Flat | C-weight | A-weight | Acceptance Limits (dB) |
|----------------|------|----------|----------|------------------------|
| 125            | 0.3  | 0.4      | 0.4      | ±1.5                   |
| 250            | 0.3  | 0.5      | 0.5      | ±1.0                   |
| 500            | 0.3  | 0.7      | 0.7      | ±1.0                   |

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

| Frequency (Hz) | Flat | A-weight | C-weight | Acceptance Limits (dB) |
|----------------|------|----------|----------|------------------------|
| 125            | -0.1 | -0.1     | 0.0      | ±2.0                   |
| 250            | 0.0  | 0.0      | 0.0      | ±1.5                   |
| 500            | 0.0  | 0.0      | 0.0      | ±1.5                   |
| 1000           | 0.0  | 0.0      | 0.0      | ±1.0                   |
| 2000           | 0.0  | 0.0      | 0.0      | ±2.0                   |
| 4000           | 0.0  | 0.0      | 0.0      | ±3.0                   |
| 8000           | 0.0  | 0.0      | 0.0      | ±5.0                   |

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

| Frequency Weighting | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---------------------|------------------------|---------------------|---------------------|------------------------|
| A-weight            | 94.0                   | 94.0                | 0.0                 | ±1.2                   |
| C-weight            | 94.0                   | 94.0                | 0.0                 | ±1.2                   |
| Flat                | 94.0                   | 94.0                | 0.0                 | ±1.2                   |

| Frequency Weighting | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---------------------|------------------------|---------------------|---------------------|------------------------|
| Flat                | 94.0                   | 94.0                | 0.0                 | ±1.0                   |
| A-weight            | 94.0                   | 94.0                | 0.0                 | ±1.0                   |
| C-weight            | 94.0                   | 94.0                | 0.0                 | ±1.0                   |

#### 6. Fast - term stability

| Frequency Weighting | S.M Display at start (dB) | S.M Display at final (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|---------------------|---------------------------|---------------------------|---------------------|------------------------|
| A-weight            | 94.0                      | 94.0                      | 0.0                 | ±1.0                   |

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

| Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|------------------------|---------------------|---------------------|------------------------|
| 107.0                  | 107.1               | +0.1                | ±1.0                   |
| 106.0                  | 106.1               | +0.1                | ±1.0                   |
| 105.0                  | 105.1               | +0.1                | ±1.0                   |
| 104.0                  | 104.1               | +0.1                | ±1.0                   |
| 103.0                  | 103.1               | +0.1                | ±1.0                   |
| 102.0                  | 102.1               | +0.1                | ±1.0                   |
| 101.0                  | 101.1               | +0.1                | ±1.0                   |
| 100.0                  | 100.1               | +0.1                | ±1.0                   |
| 99.0                   | 99.1                | +0.1                | ±1.0                   |
| 98.0                   | 98.1                | +0.1                | ±1.0                   |
| 97.0                   | 97.1                | +0.1                | ±1.0                   |
| 96.0                   | 96.1                | +0.1                | ±1.0                   |
| 95.0                   | 95.1                | +0.1                | ±1.0                   |
| 94.0                   | 94.1                | +0.1                | ±1.0                   |
| 93.0                   | 93.1                | +0.1                | ±1.0                   |
| 92.0                   | 92.1                | +0.1                | ±1.0                   |
| 91.0                   | 91.1                | +0.1                | ±1.0                   |
| 90.0                   | 90.1                | +0.1                | ±1.0                   |
| 89.0                   | 89.1                | +0.1                | ±1.0                   |
| 88.0                   | 88.1                | +0.1                | ±1.0                   |
| 87.0                   | 87.1                | +0.1                | ±1.0                   |
| 86.0                   | 86.1                | +0.1                | ±1.0                   |
| 85.0                   | 85.1                | +0.1                | ±1.0                   |
| 84.0                   | 84.1                | +0.1                | ±1.0                   |
| 83.0                   | 83.1                | +0.1                | ±1.0                   |
| 82.0                   | 82.1                | +0.1                | ±1.0                   |
| 81.0                   | 81.1                | +0.1                | ±1.0                   |
| 80.0                   | 80.1                | +0.1                | ±1.0                   |
| 79.0                   | 79.1                | +0.1                | ±1.0                   |
| 78.0                   | 78.1                | +0.1                | ±1.0                   |
| 77.0                   | 77.1                | +0.1                | ±1.0                   |
| 76.0                   | 76.1                | +0.1                | ±1.0                   |
| 75.0                   | 75.1                | +0.1                | ±1.0                   |

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

| Range | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|-------|------------------------|---------------------|---------------------|------------------------|
| Audio | 94.0                   | 94.0                | 0.0                 | ±1.2                   |

#### 9. Time burst response

| Time | Time burst duration, Th (ms) | Cycle | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|------|------------------------------|-------|------------------------|---------------------|---------------------|------------------------|
| Flat | 0.25                         | 2     | 108.5                  | 107.9               | -0.6                | 1.2 - 5.0              |
|      | 2                            | 8     | 117.8                  | 117.6               | -0.2                | 1.6 - 2.5              |
| Sine | 200                          | 800   | 134.0                  | 134.0               | 0.0                 | ±1.0                   |
|      | 200                          | 800   | 127.8                  | 127.8               | 0.0                 | ±1.0                   |
| SPL  | 0.25                         | 2     | 99.5                   | 99.9                | +0.4                | 1.2 - 5.0              |
|      | 2                            | 8     | 108.0                  | 108.0               | 0.0                 | 1.6 - 2.5              |
|      | 200                          | 800   | 128.0                  | 128.1               | +0.1                | ±1.0                   |

#### 10. Peak C-weight level

| Number of cycle in sine signal | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|--------------------------------|------------------------|---------------------|---------------------|------------------------|
| Continuous                     | 133.0                  | 133.0               | 0.0                 | ±1.0                   |
| One                            | 136.4                  | 135.8               | -0.6                | ±1.0                   |

| Number of cycle in sine signal | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limits (dB) |
|--------------------------------|------------------------|---------------------|---------------------|------------------------|
| Continuous                     | 133.0                  | 132.8               | -0.2                | ±2.0                   |
| Positive half cycle            | 135.8                  | 135.1               | -0.7                | ±2.0                   |
| Negative half cycle            | 135.8                  | 135.1               | -0.7                | ±2.0                   |

T. Petch

# SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

401/403 Srinakharinwirot Road, Bangkok, Thailand 10110 (Thailand)  
Tel: +66 2148 8027 E-mail: sithiporn@calibration.com



Cert. No.: ACL24174  
Job No.: VCE7AC0819  
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## 13. Overall indication

| Measured value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|---------------------|---------------------|-----------------------|
| Positive            | Negative            | Acceptance Limit      |
| 95.5                | 99.7                | ± 0.5                 |

## 12. High level stability

| Frequency W weighting | S.M Display at start (dB) | S.M Display at End (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|-----------------------|---------------------------|-------------------------|---------------------|-----------------------|
| A-weight              | 127.0                     | 127.0                   | 0.0                 | ± 0.5                 |

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

End of Calibration Certificate

T. Petch

# SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

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Tel: +66 2148 8027 E-mail: sithiporn@calibration.com



Cert. No.: ACL24224  
Job No.: VCE7AC0819  
Page: 3 of 8

## Summary of Measurement Result:

| Parameter   | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|---|------------------|---|
| 1. Absolute accuracy                                  | 0.2              | N/A   |
| 2. Self-generated noise                               | 0.2              | N/A   |
| 3. Accuracy of signal level of frequency weightings   |                  |   |
| 125 Hz  | 0.3              | 0.0   |
| 1000 Hz   | 0.3              | 0.0   |
| 5000 Hz   | 0.3              | 0.7   |
| 4. Frequency signal level of frequency weightings     |                  |   |
| For 50 Hz to 10 kHz                                   | 0.3              | 0.0   |
| For > 10 kHz to 20 kHz                                | 0.3              | 0.7   |
| 5. Frequency and time weightings at 1 kHz             | 0.2              | 0.2   |
| 6. Long term stability                                | 0.1              | 0.1   |
| 7. Level inaccuracy on the reference level noise      | 0.2              | 0.2   |
| 8. Level inaccuracy including the level range control | 0.2              | 0.2   |
| 9. Time base response                                 | 0.2              | 0.2   |
| 10. Peak C-weight level                               | 0.2              | 0.2   |
| 11. Overall indication                                | 0.2              | 0.2   |
| 12. High level stability                              | 0.1              | 0.1   |

T. Petch

# SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

401/403 Srinakharinwirot Road, Bangkok, Thailand 10110 (Thailand)  
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Cert. No.: ACL24224  
Job No.: VCE7AC0819  
Page: 3 of 8

## 2. Level inaccuracy on the reference level noise

| Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|------------------------|---------------------|---------------------|-----------------------|
| 125.0                  | 125.0               | 0.0                 | ± 0.2                 |
| 126.0                  | 126.0               | 0.0                 | ± 0.2                 |
| 127.0                  | 127.0               | 0.0                 | ± 0.2                 |
| 128.0                  | 128.0               | 0.0                 | ± 0.2                 |
| 129.0                  | 129.0               | 0.0                 | ± 0.2                 |
| 130.0                  | 130.0               | 0.0                 | ± 0.2                 |
| 131.0                  | 131.0               | 0.0                 | ± 0.2                 |
| 132.0                  | 132.0               | 0.0                 | ± 0.2                 |
| 133.0                  | 133.0               | 0.0                 | ± 0.2                 |
| 134.0                  | 134.0               | 0.0                 | ± 0.2                 |
| 135.0                  | 135.0               | 0.0                 | ± 0.2                 |
| 136.0                  | 136.0               | 0.0                 | ± 0.2                 |
| 137.0                  | 137.0               | 0.0                 | ± 0.2                 |
| 138.0                  | 138.0               | 0.0                 | ± 0.2                 |
| 139.0                  | 139.0               | 0.0                 | ± 0.2                 |
| 140.0                  | 140.0               | 0.0                 | ± 0.2                 |
| 141.0                  | 141.0               | 0.0                 | ± 0.2                 |
| 142.0                  | 142.0               | 0.0                 | ± 0.2                 |
| 143.0                  | 143.0               | 0.0                 | ± 0.2                 |
| 144.0                  | 144.0               | 0.0                 | ± 0.2                 |
| 145.0                  | 145.0               | 0.0                 | ± 0.2                 |
| 146.0                  | 146.0               | 0.0                 | ± 0.2                 |
| 147.0                  | 147.0               | 0.0                 | ± 0.2                 |
| 148.0                  | 148.0               | 0.0                 | ± 0.2                 |
| 149.0                  | 149.0               | 0.0                 | ± 0.2                 |
| 150.0                  | 150.0               | 0.0                 | ± 0.2                 |
| 151.0                  | 151.0               | 0.0                 | ± 0.2                 |
| 152.0                  | 152.0               | 0.0                 | ± 0.2                 |
| 153.0                  | 153.0               | 0.0                 | ± 0.2                 |
| 154.0                  | 154.0               | 0.0                 | ± 0.2                 |
| 155.0                  | 155.0               | 0.0                 | ± 0.2                 |
| 156.0                  | 156.0               | 0.0                 | ± 0.2                 |
| 157.0                  | 157.0               | 0.0                 | ± 0.2                 |
| 158.0                  | 158.0               | 0.0                 | ± 0.2                 |
| 159.0                  | 159.0               | 0.0                 | ± 0.2                 |
| 160.0                  | 160.0               | 0.0                 | ± 0.2                 |

T. Petch

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401/403 Srinakharinwirot Road, Bangkok, Thailand 10110 (Thailand)  
Tel: +66 2148 8027 E-mail: sithiporn@calibration.com



Cert. No.: ACL24226  
Job No.: VCE7AC0819  
Page: 3 of 8

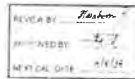
## Calibration Certificate

Equipment: SURROUND LIVE MI 11 K  
Manufacturer: JBL  
Model: ML-42 Monophonic UC 12 Decapoles NH 24  
Serial No: 00632141 14757 15740  
ID No: 8888 150000

Condition As Found: OK

Customer: AIS LABORATORY GROUP (THAI) AND CO. LTD  
104 PHAI PHAN KAN 40 PHAI PHAN KAN ROAD  
KHAO LAO PHAI PHAN KAN 40 PHAI PHAN KAN ROAD  
BANGKOK 10300 THAILAND

Location: Ambient Temperature: 24.8 ± 0.3 °C  
Pressure: 1013.2 ± 0.1 hPa  
Relative Humidity: 60.8 ± 0.1 %  
Received Date: 07 JULY 2024  
Calibration Date: 07 JULY 2024  
Date of Issue: 07 JULY 2024



Calibrated by: T. Petch

Approved by: T. Petch  
(Thakul Petch)

This certificate is issued in accordance with the requirements of ISO 17025 standard, this is to be reproduced other than as it is except with the prior written approval of the Issuing Laboratory

# SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

401/403 Srinakharinwirot Road, Bangkok, Thailand 10110 (Thailand)  
Tel: +66 2148 8027 E-mail: sithiporn@calibration.com



Cert. No.: ACL24226  
Job No.: VCE7AC0819  
Page: 3 of 8

## Calibration Procedure: CP-01

### Calibration Method:

This equipment was calibrated by follow on IEC 61672-2 (2013) Standard for sound level meter (SLM)  
The SLM had been in accordance with International signal level of frequency weighting with A-weight, C-weight and Reference Standard test results.  
For the results of each test result, and the relevant data of each frequency weighting and also with SLM's display

### Condition of this result of calibration:

| Instrument             | Model  | Serial No   | Cert. No | Due Date |
|------------------------|--------|-------------|----------|----------|
| Waveform Generator     | 21110A | MY 00101010 | 11-00-24 | 08-08-25 |
| Waveform Generator     | 13110A | MY 00102101 | 11-00-24 | 08-08-25 |
| Signal Meter           | 13461A | MY 00102101 | 11-00-24 | 13-08-25 |
| Top of Meter           | 13461A | MY 00102101 | 11-00-24 | 13-08-25 |
| Digital Multimeter     | 13461A | MY 00102101 | 11-00-24 | 13-08-25 |
| Programmable Amplifier | 13461A | MY 00102101 | 11-00-24 | 13-08-25 |
| Condenser Microphone   | 13461A | MY 00102101 | 11-00-24 | 13-08-25 |
| Measurement Amplifier  | 13461A | MY 00102101 | 11-00-24 | 13-08-25 |

2. This result of calibration was found accurate as shown on date and place of calibration for this calibration only  
3. This certificate is traceable to the International system of units (SI) as defined in  
3.1 National Institute of Metrology (NIM) and  
3.2 Thailand Institute of Standards and Technological Research (TISTR)

T. Petch

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401/403 Srinakharinwirot Road, Bangkok, Thailand 10110 (Thailand)  
Tel: +66 2148 8027 E-mail: sithiporn@calibration.com



Cert. No.: ACL24226  
Job No.: VCE7AC0819  
Page: 3 of 8

## 4. Electrical signal level of frequency weightings

### 4.1 Frequency weighting response with relative to 1 kHz

| Frequency (Hz) | Reference Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|----------------|----------------------|---------------------|---------------------|-----------------------|
| 63             | 0.1                  | -0.1                | -0.2                | ± 0.5                 |
| 125            | 0.0                  | 0.0                 | 0.0                 | ± 0.5                 |
| 250            | 0.0                  | 0.0                 | 0.0                 | ± 0.5                 |
| 500            | 0.0                  | 0.0                 | 0.0                 | ± 0.5                 |
| 1000           | 0.0                  | 0.0                 | 0.0                 | ± 0.5                 |
| 2000           | 0.0                  | 0.0                 | 0.0                 | ± 0.5                 |
| 4000           | 0.0                  | 0.0                 | 0.0                 | ± 0.5                 |
| 8000           | 0.0                  | 0.0                 | 0.0                 | ± 0.5                 |

### 4.2 Frequency weighting at 1 kHz

| Frequency (Hz) | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|----------------|------------------------|---------------------|---------------------|-----------------------|
| 125            | 0.1                    | -0.1                | -0.2                | ± 0.5                 |
| 250            | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |
| 500            | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |
| 1000           | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |
| 2000           | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |
| 4000           | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |
| 8000           | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |

### 4.3 Long term stability at 1 kHz

| Frequency (Hz) | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|----------------|------------------------|---------------------|---------------------|-----------------------|
| 125            | 0.1                    | -0.1                | -0.2                | ± 0.5                 |
| 250            | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |
| 500            | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |
| 1000           | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |
| 2000           | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |
| 4000           | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |
| 8000           | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |

### 4.4 Long term stability

| Frequency (Hz) | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|----------------|------------------------|---------------------|---------------------|-----------------------|
| 125            | 0.1                    | -0.1                | -0.2                | ± 0.5                 |
| 250            | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |
| 500            | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |
| 1000           | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |
| 2000           | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |
| 4000           | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |
| 8000           | 0.0                    | 0.0                 | 0.0                 | ± 0.5                 |

T. Petch

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Cert. No.: ACL24226  
Job No.: VCE7AC0819  
Page: 3 of 8

## 11. Overall indication

| Measured value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|---------------------|---------------------|-----------------------|
| Positive            | Negative            | Acceptance Limit      |
| 95.5                | 99.7                | ± 0.5                 |

## 12. High level stability

| Frequency W weighting | S.M Display at start (dB) | S.M Display at End (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|-----------------------|---------------------------|-------------------------|---------------------|-----------------------|
| A-weight              | 127.0                     | 127.0                   | 0.0                 | ± 0.5                 |

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

End of Calibration Certificate

T. Petch

Cert. No. : AC L24203  
Job No. : AC 67AC 0106  
Pages : 3 of 8

#### Summary of Measurement Results :

| Parameter  | Service life (dR) | Maximum permitted uncertainty of measurement (dR) |
|--|-------------------|---|
| 1) Average accuracy                              | 0.2               | N/A   |
| 2) Self-powered noise                            | 0.2               | N/A   |
| 3) Automatic signal loss of frequency components |                   |   |
| 125 Hz   | 0.1               | 0.8   |
| 1000 Hz  | 0.1               | 0.8   |
| 1000 Hz  | 0.2               | 0.8   |
| 4) Electric signal loss of frequency components  |                   |   |
| For 1000 Hz                                      | 0.3               | 0.8   |
| For 1000 Hz                                      | 0.3               | 0.8   |
| For 1000 Hz                                      | 0.3               | 1.0   |
| 5) Frequency and time response at 1 kHz          | 0.2               | 0.2   |
| 6) Level measurement                             | 0.3               | 0.1   |
| 7) Level measurement reference level range       | 0.2               | 0.2   |
| 8) Level measurement level range control         | 0.2               | 0.3   |
| 9) Time base accuracy                            | 0.2               | 0.3   |
| 10) Peak-to-peak ratio                           | 0.2               | 0.3   |
| 11) Voltage level accuracy                       | 0.2               | 0.2   |
| 12) Voltage level stability                      | 0.2               | 0.1   |

Cert. No. : ACl 24205  
Job No. : 3167 Acl 0108

<sup>†</sup> Level 0 means on the relevance level (none).

... (b) (5) DPP, and the information does not fall within the scope of the exemption.

| Antecedent<br>Value<br>( $\sigma$ ) | Unobserved<br>Value<br>( $\sigma$ ) | Theoretical<br>Value<br>( $\sigma$ ) | Acceptance<br>Level<br>( $\sigma$ ) |
|-------------------------------------|-------------------------------------|--------------------------------------|-------------------------------------|
| 1.17                                | 1.17                                | 0.00                                 | 00.0                                |
| 1.56                                | 1.56                                | 0.00                                 | 00.0                                |
| 1.94                                | 1.94                                | 0.00                                 | 00.0                                |
| 2.32                                | 2.32                                | 0.00                                 | 00.0                                |
| 2.70                                | 2.70                                | 0.00                                 | 00.0                                |
| 3.08                                | 3.08                                | 0.00                                 | 00.0                                |
| 3.46                                | 3.46                                | 0.00                                 | 00.0                                |
| 3.84                                | 3.84                                | 0.00                                 | 00.0                                |
| 4.22                                | 4.22                                | 0.00                                 | 00.0                                |
| 4.60                                | 4.60                                | 0.00                                 | 00.0                                |
| 4.98                                | 4.98                                | 0.00                                 | 00.0                                |
| 5.36                                | 5.36                                | 0.00                                 | 00.0                                |
| 5.74                                | 5.74                                | 0.00                                 | 00.0                                |
| 6.12                                | 6.12                                | 0.00                                 | 00.0                                |
| 6.50                                | 6.50                                | 0.00                                 | 00.0                                |
| 6.88                                | 6.88                                | 0.00                                 | 00.0                                |
| 7.26                                | 7.26                                | 0.00                                 | 00.0                                |
| 7.64                                | 7.64                                | 0.00                                 | 00.0                                |
| 8.02                                | 8.02                                | 0.00                                 | 00.0                                |
| 8.40                                | 8.40                                | 0.00                                 | 00.0                                |
| 8.78                                | 8.78                                | 0.00                                 | 00.0                                |
| 9.16                                | 9.16                                | 0.00                                 | 00.0                                |
| 9.54                                | 9.54                                | 0.00                                 | 00.0                                |
| 9.92                                | 9.92                                | 0.00                                 | 00.0                                |
| 10.30                               | 10.30                               | 0.00                                 | 00.0                                |
| 10.68                               | 10.68                               | 0.00                                 | 00.0                                |
| 11.06                               | 11.06                               | 0.00                                 | 00.0                                |
| 11.44                               | 11.44                               | 0.00                                 | 00.0                                |
| 11.82                               | 11.82                               | 0.00                                 | 00.0                                |
| 12.20                               | 12.20                               | 0.00                                 | 00.0                                |
| 12.58                               | 12.58                               | 0.00                                 | 00.0                                |
| 12.96                               | 12.96                               | 0.00                                 | 00.0                                |
| 13.34                               | 13.34                               | 0.00                                 | 00.0                                |
| 13.72                               | 13.72                               | 0.00                                 | 00.0                                |
| 14.10                               | 14.10                               | 0.00                                 | 00.0                                |
| 14.48                               | 14.48                               | 0.00                                 | 00.0                                |
| 14.86                               | 14.86                               | 0.00                                 | 00.0                                |
| 15.24                               | 15.24                               | 0.00                                 | 00.0                                |
| 15.62                               | 15.62                               | 0.00                                 | 00.0                                |
| 16.00                               | 16.00                               | 0.00                                 | 00.0                                |
| 16.38                               | 16.38                               | 0.00                                 | 00.0                                |
| 16.76                               | 16.76                               | 0.00                                 | 00.0                                |
| 17.14                               | 17.14                               | 0.00                                 | 00.0                                |
| 17.52                               | 17.52                               | 0.00                                 | 00.0                                |
| 17.90                               | 17.90                               | 0.00                                 | 00.0                                |
| 18.28                               | 18.28                               | 0.00                                 | 00.0                                |
| 18.66                               | 18.66                               | 0.00                                 | 00.0                                |
| 19.04                               | 19.04                               | 0.00                                 | 00.0                                |
| 19.42                               | 19.42                               | 0.00                                 | 00.0                                |
| 19.80                               | 19.80                               | 0.00                                 | 00.0                                |
| 20.18                               | 20.18                               | 0.00                                 | 00.0                                |
| 20.56                               | 20.56                               | 0.00                                 | 00.0                                |
| 20.94                               | 20.94                               | 0.00                                 | 00.0                                |
| 21.32                               | 21.32                               | 0.00                                 | 00.0                                |
| 21.70                               | 21.70                               | 0.00                                 | 00.0                                |
| 22.08                               | 22.08                               | 0.00                                 | 00.0                                |
| 22.46                               | 22.46                               | 0.00                                 | 00.0                                |
| 22.84                               | 22.84                               | 0.00                                 | 00.0                                |
| 23.22                               | 23.22                               | 0.00                                 | 00.0                                |
| 23.60                               | 23.60                               | 0.00                                 | 00.0                                |
| 23.98                               | 23.98                               | 0.00                                 | 00.0                                |
| 24.36                               | 24.36                               | 0.00                                 | 00.0                                |
| 24.74                               | 24.74                               | 0.00                                 | 00.0                                |
| 25.12                               | 25.12                               | 0.00                                 | 00.0                                |
| 25.50                               | 25.50                               | 0.00                                 | 00.0                                |
| 25.88                               | 25.88                               | 0.00                                 | 00.0                                |
| 26.26                               | 26.26                               | 0.00                                 | 00.0                                |
| 26.64                               | 26.64                               | 0.00                                 | 00.0                                |
| 27.02                               | 27.02                               | 0.00                                 | 00.0                                |
| 27.40                               | 27.40                               | 0.00                                 | 00.0                                |
| 27.78                               | 27.78                               | 0.00                                 | 00.0                                |
| 28.16                               | 28.16                               | 0.00                                 | 00.0                                |
| 28.54                               | 28.54                               | 0.00                                 | 00.0                                |
| 28.92                               | 28.92                               | 0.00                                 | 00.0                                |
| 29.30                               | 29.30                               | 0.00                                 | 00.0                                |
| 29.68                               | 29.68                               | 0.00                                 | 00.0                                |
| 30.06                               | 30.06                               | 0.00                                 | 00.0                                |
| 30.44                               | 30.44                               | 0.00                                 | 00.0                                |
| 30.82                               | 30.82                               | 0.00                                 | 00.0                                |
| 31.20                               | 31.20                               | 0.00                                 | 00.0                                |
| 31.58                               | 31.58                               | 0.00                                 | 00.0                                |
| 31.96                               | 31.96                               | 0.00                                 | 00.0                                |
| 32.34                               | 32.34                               | 0.00                                 | 00.0                                |
| 32.72                               | 32.72                               | 0.00                                 | 00.0                                |
| 33.10                               | 33.10                               | 0.00                                 | 00.0                                |
| 33.48                               | 33.48                               | 0.00                                 | 00.0                                |
| 33.86                               | 33.86                               | 0.00                                 | 00.0                                |
| 34.24                               | 34.24                               | 0.00                                 | 00.0                                |
| 34.62                               | 34.62                               | 0.00                                 | 00.0                                |
| 35.00                               | 35.00                               | 0.00                                 | 00.0                                |
| 35.38                               | 35.38                               | 0.00                                 | 00.0                                |
| 35.76                               | 35.76                               | 0.00                                 | 00.0                                |
| 36.14                               | 36.14                               | 0.00                                 | 00.0                                |
| 36.52                               | 36.52                               | 0.00                                 | 00.0                                |

|       |      |      |      |
|-------|------|------|------|
| 27.01 | 2.70 | 0.15 | 20.8 |
|-------|------|------|------|

T. E. L. L.

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CALIBRATION LABORATORY

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Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION

T. P. L. M.

Model: NZ-42 'Microphone UC-32 Pre-amplifier KH 24  
Serial No.: 00597162 / 180405 / 88175  
ID No.: WKA FS0997

THE ASSOCIATION OF  
ECONOMIC CONSULTANTS

Cert. No.: ACL24018  
 Pages: 1 of 8

## Calibration Certificate

Equipment : SOUND LEVEL METER  
Manufacturer : RION  
Model : NA-42 ' Microphone UC-52 Pre-amplifier NH 24  
Serial No. : 00597162 ' J80405 ' 88175  
ID No. : UKA 150007

Condition As Entered : 10/1/2011

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.  
104 PHATTHANAKAN 40 PHATTHANAKAN ROAD  
KHUAEANG PHATTHANAKAN, KHUET SUAN LUANG  
BANGKOK, 10250 THAILAND

Location :  
Ambient Temperature :  $(23.0 \pm 3)$   
Pressure :  $(101.3 \pm 5)$   
Relative Humidity :  $(50.0 \pm 20)$

Received Date : 22 JULY 2023  
Calibration Date : 19 JULY 2024  
Date of Issue : 12 JANUARY 2024

Calibrated by: SAFARI, Thompson

Approved by :   
(Tharadul Petchum)

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

G. L. L. L.

T. R. L. L.



# SITHIPORN ASSOCIATES CO., LTD. CALIBRATION LABORATORY

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Cert. No.: ACL23018  
Job No.: VC67AC0045  
Pages: 2 of 8

Calibration Procedure: (P. 3) of 4

## Calibration Method:

This equipment was calibrated by follow on B-61672-3 (2013) Standard for sound level meter (SLM).  
The SLM had been to Acoustical and Electrical signal tests of frequency weighting with A-weight, C-weight and Reference Standard Instruments.  
For test results of each item were made by: Observations of each instrument display and also with SLM display.

## Condition of this result of calibration:

### 1. Reference Standard Instruments:

| Instrument              | Model    | Serial No. | Cert. No.     | Due Date  |
|-------------------------|----------|------------|---------------|-----------|
| Waveform Generator      | 33210A   | MY4807076  | LJ 0409 23    | 07 Feb 24 |
| Waveform Generator      | 33511A   | MY52302742 | LJ 0109 23    | 07 Feb 24 |
| Digital Multimeter      | 33461A   | MY53220100 | 032 BP 300206 | 11 Feb 24 |
| Digital Multimeter      | 33461A   | MY53220074 | 032 BP 300206 | 11 Feb 24 |
| Digital Multimeter      | 34461A   | MY60024713 | EEL HP 10240  | 14 Feb 24 |
| Programmable Attenuator | MAT 1070 | 02100114   | 11 0011 23    | 06 11 24  |
| Condenser Microphone    | 4180     | 2677906    | AA 1001 23    | 14 Feb 24 |
| Measuring Amplifier     | NA-25KAI | M366005    | AA 3002 23    | 14 Feb 24 |

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

3. This certificate is transferable to the international system of units maintained in:  
3.1 National Institute of Metrology (Thailand).  
3.2 Thailand Institute of Scientific and Technological Research (TISTR).

T. Pichai

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Cert. No.: ACL23018  
Job No.: VC67AC0045  
Pages: 3 of 8

## Summary of Measurement Result:

| Parameter   | Uncertainty (dB) | Maximum permitted uncertainty of measurement (dB) |
|---|------------------|---|
| 1. Absolute sensitivity                             | 0.3              | N/A   |
| 2. Self-generated noise                             | 0.2              | N/A   |
| 3. Acoustical signal tests of frequency weightings  |                  |   |
| 125 Hz  | 0.3              | 0.6   |
| 1100 Hz   | 0.3              | 0.6   |
| 8000 Hz   | 0.3              | 0.6   |
| 4. Electrical signal tests of frequency weightings  |                  |   |
| For 10 Hz to 20 kHz                                 | 0.3              | 0.6   |
| For 10 Hz to 20 kHz                                 | 0.3              | 0.6   |
| For 10 Hz to 20 kHz                                 | 0.3              | 0.6   |
| 5. Frequency and time weightings at 1 kHz           | 0.2              | 0.2   |
| 6. Long-term stability                              | 0.3              | 0.3   |
| 7. Level accuracy in the reference level range      | 0.2              | 0.2   |
| 8. Level accuracy including the level range control | 0.2              | 0.2   |
| 9. Time-Freq response                               | 0.2              | 0.2   |
| 10. Peak C-weight level                             | 0.2              | 0.2   |
| 11. Overload indicator                              | 0.2              | 0.2   |
| 12. High level stability                            | 0.3              | 0.3   |

## Result of calibration:

### 1. Absolute sensitivity

| Reference Value (dB) | Measured Value (dB) | Deviation (dB) | Acceptance Limit (dB) |
|----------------------|---------------------|----------------|-----------------------|
| 93.5 (0.3)           | 93.8                | 0.3            | +0.3                  |

### 2. Self-generated noise

#### 2.1. Self-generated noise

| Measured Value (dB) |
|---------------------|
| 93.3                |

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

| Frequency (Hz) | Measured Value (dB) |
|----------------|---------------------|
| A-weight       | 12.0                |
| C-weight       | 13.3                |
| Flat           | 14.3                |

### 3. Acoustical signal tests of frequency weightings

Mean time of the acoustic response at a level of 94 dB

| Frequency (Hz) | Deviation from reference frequency weighting response curve (dB) | Acceptance Limit (dB) |
|----------------|--|-----------------------|
| 125            | -0.1   | 0.2                   |
| 1100           | 0.0  | 0.2                   |
| 8000           | 0.5  | 0.6                   |

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## A. Electrical signal tests of frequency weightings

Weighting network response with tolerance of 1 kHz

| Frequency (Hz) | Flat | F-weight | A-weight | Acceptance Limit (dB) |
|----------------|------|----------|----------|-----------------------|
| 50             | -0.1 | -0.1     | 0.0      | +2.0                  |
| 125            | -0.0 | -0.0     | 0.0      | +1.5                  |
| 250            | -0.0 | -0.0     | 0.0      | +1.5                  |
| 500            | -0.0 | -0.1     | 0.0      | +1.5                  |
| 1000           | -0.0 | -0.0     | 0.0      | +1.0                  |
| 2000           | -0.0 | -0.0     | 0.0      | +2.0                  |
| 4000           | -0.0 | -0.0     | 0.0      | +1.0                  |
| 8000           | -0.0 | -0.1     | 0.1      | +1.0                  |

## B. Frequency and time weightings at 1 kHz

3.1 Frequency weightings at 1 kHz

| Frequency Weighting (dB) | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|--------------------------|------------------------|---------------------|---------------------|-----------------------|
| A-weight                 | 94.0                   | 94.0                | 0.0                 | +0.2                  |
| C-weight                 | 94.0                   | 94.0                | 0.0                 | +0.2                  |
| Flat                     | 94.0                   | 94.0                | 0.0                 | +0.2                  |

3.2 Time weighting at 1 kHz

| Frequency Weighting (dB) | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|--------------------------|------------------------|---------------------|---------------------|-----------------------|
| Flat                     | 94.0                   | 94.0                | 0.0                 | +0.1                  |
| Slow                     | 94.0                   | 94.0                | 0.0                 | +0.1                  |
| Fast                     | 94.0                   | 94.0                | 0.0                 | +0.1                  |

## C. Long-term stability

| Frequency Weighting (dB) | SLM Display at initial (dB) | SLM Display at final (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|--------------------------|-----------------------------|---------------------------|---------------------|-----------------------|
| A-weight                 | 94.0                        | 94.0                      | 0.0                 | +0.3                  |

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## 7. Level accuracy in the reference level range

| Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|------------------------|---------------------|---------------------|-----------------------|
| 137.0                  | 137.0               | 0.0                 | +1.1                  |
| 136.0                  | 136.0               | 0.0                 | +1.1                  |
| 135.0                  | 135.0               | 0.0                 | +1.1                  |
| 134.0                  | 134.0               | 0.0                 | +1.1                  |
| 133.0                  | 133.0               | 0.0                 | +1.1                  |
| 132.0                  | 132.0               | 0.0                 | +1.1                  |
| 131.0                  | 131.0               | 0.0                 | +1.1                  |
| 130.0                  | 130.0               | 0.0                 | +1.1                  |
| 129.0                  | 129.0               | 0.0                 | +1.1                  |
| 128.0                  | 128.0               | 0.0                 | +1.1                  |
| 127.0                  | 127.0               | 0.0                 | +1.1                  |
| 126.0                  | 126.0               | 0.0                 | +1.1                  |
| 125.0                  | 125.0               | 0.0                 | +1.1                  |
| 124.0                  | 124.0               | 0.0                 | +1.1                  |
| 123.0                  | 123.0               | 0.0                 | +1.1                  |
| 122.0                  | 122.0               | 0.0                 | +1.1                  |
| 121.0                  | 121.0               | 0.0                 | +1.1                  |
| 120.0                  | 120.0               | 0.0                 | +1.1                  |
| 119.0                  | 119.0               | 0.0                 | +1.1                  |
| 118.0                  | 118.0               | 0.0                 | +1.1                  |
| 117.0                  | 117.0               | 0.0                 | +1.1                  |
| 116.0                  | 116.0               | 0.0                 | +1.1                  |
| 115.0                  | 115.0               | 0.0                 | +1.1                  |
| 114.0                  | 114.0               | 0.0                 | +1.1                  |
| 113.0                  | 113.0               | 0.0                 | +1.1                  |
| 112.0                  | 112.0               | 0.0                 | +1.1                  |
| 111.0                  | 111.0               | 0.0                 | +1.1                  |
| 110.0                  | 110.0               | 0.0                 | +1.1                  |
| 109.0                  | 109.0               | 0.0                 | +1.1                  |
| 108.0                  | 108.0               | 0.0                 | +1.1                  |
| 107.0                  | 107.0               | 0.0                 | +1.1                  |
| 106.0                  | 106.0               | 0.0                 | +1.1                  |
| 105.0                  | 105.0               | 0.0                 | +1.1                  |
| 104.0                  | 104.0               | 0.0                 | +1.1                  |
| 103.0                  | 103.0               | 0.0                 | +1.1                  |
| 102.0                  | 102.0               | 0.0                 | +1.1                  |
| 101.0                  | 101.0               | 0.0                 | +1.1                  |
| 100.0                  | 100.0               | 0.0                 | +1.1                  |
| 99.0                   | 99.0                | 0.0                 | +1.1                  |
| 98.0                   | 98.0                | 0.0                 | +1.1                  |
| 97.0                   | 97.0                | 0.0                 | +1.1                  |
| 96.0                   | 96.0                | 0.0                 | +1.1                  |
| 95.0                   | 95.0                | 0.0                 | +1.1                  |
| 94.0                   | 94.0                | 0.0                 | +1.1                  |
| 93.0                   | 93.0                | 0.0                 | +1.1                  |
| 92.0                   | 92.0                | 0.0                 | +1.1                  |
| 91.0                   | 91.0                | 0.0                 | +1.1                  |
| 90.0                   | 90.0                | 0.0                 | +1.1                  |
| 89.0                   | 89.0                | 0.0                 | +1.1                  |
| 88.0                   | 88.0                | 0.0                 | +1.1                  |
| 87.0                   | 87.0                | 0.0                 | +1.1                  |
| 86.0                   | 86.0                | 0.0                 | +1.1                  |
| 85.0                   | 85.0                | 0.0                 | +1.1                  |
| 84.0                   | 84.0                | 0.0                 | +1.1                  |
| 83.0                   | 83.0                | 0.0                 | +1.1                  |
| 82.0                   | 82.0                | 0.0                 | +1.1                  |
| 81.0                   | 81.0                | 0.0                 | +1.1                  |
| 80.0                   | 80.0                | 0.0                 | +1.1                  |
| 79.0                   | 79.0                | 0.0                 | +1.1                  |
| 78.0                   | 78.0                | 0.0                 | +1.1                  |
| 77.0                   | 77.0                | 0.0                 | +1.1                  |
| 76.0                   | 76.0                | 0.0                 | +1.1                  |
| 75.0                   | 75.0                | 0.0                 | +1.1                  |
| 74.0                   | 74.0                | 0.0                 | +1.1                  |
| 73.0                   | 73.0                | 0.0                 | +1.1                  |
| 72.0                   | 72.0                | 0.0                 | +1.1                  |
| 71.0                   | 71.0                | 0.0                 | +1.1                  |
| 70.0                   | 70.0                | 0.0                 | +1.1                  |
| 69.0                   | 69.0                | 0.0                 | +1.1                  |
| 68.0                   | 68.0                | 0.0                 | +1.1                  |
| 67.0                   | 67.0                | 0.0                 | +1.1                  |
| 66.0                   | 66.0                | 0.0                 | +1.1                  |
| 65.0                   | 65.0                | 0.0                 | +1.1                  |
| 64.0                   | 64.0                | 0.0                 | +1.1                  |
| 63.0                   | 63.0                | 0.0                 | +1.1                  |
| 62.0                   | 62.0                | 0.0                 | +1.1                  |
| 61.0                   | 61.0                | 0.0                 | +1.1                  |
| 60.0                   | 60.0                | 0.0                 | +1.1                  |
| 59.0                   | 59.0                | 0.0                 | +1.1                  |
| 58.0                   | 58.0                | 0.0                 | +1.1                  |
| 57.0                   | 57.0                | 0.0                 | +1.1                  |
| 56.0                   | 56.0                | 0.0                 | +1.1                  |
| 55.0                   | 55.0                | 0.0                 | +1.1                  |
| 54.0                   | 54.0                | 0.0                 | +1.1                  |
| 53.0                   | 53.0                | 0.0                 | +1.1                  |
| 52.0                   | 52.0                | 0.0                 | +1.1                  |
| 51.0                   | 51.0                | 0.0                 | +1.1                  |
| 50.0                   | 50.0                | 0.0                 | +1.1                  |
| 49.0                   | 49.0                | 0.0                 | +1.1                  |
| 48.0                   | 48.0                | 0.0                 | +1.1                  |
| 47.0                   | 47.0                | 0.0                 | +1.1                  |
| 46.0                   | 46.0                | 0.0                 | +1.1                  |
| 45.0                   | 45.0                | 0.0                 | +1.1                  |
| 44.0                   | 44.0                | 0.0                 | +1.1                  |
| 43.0                   | 43.0                | 0.0                 | +1.1                  |
| 42.0                   | 42.0                | 0.0                 | +1.1                  |
| 41.0                   | 41.0                | 0.0                 | +1.1                  |
| 40.0                   | 40.0                | 0.0                 | +1.1                  |
| 39.0                   | 39.0                | 0.0                 | +1.1                  |
| 38.0                   | 38.0                | 0.0                 | +1.1                  |
| 37.0                   | 37.0                | 0.0                 | +1.1                  |
| 36.0                   | 36.0                | 0.0                 | +1.1                  |
| 35.0                   | 35.0                | 0.0                 | +1.1                  |
| 34.0                   | 34.0                | 0.0                 | +1.1                  |
| 33.0                   | 33.0                | 0.0                 | +1.1                  |
| 32.0                   | 32.0                | 0.0                 | +1.1                  |
| 31.0                   | 31.0                | 0.0                 | +1.1                  |
| 30.0                   | 30.0                | 0.0                 | +1.1                  |
| 29.0                   | 29.0                | 0.0                 | +1.1                  |
| 28.0                   | 28.0                | 0.0                 | +1.1                  |
| 27.0                   | 27.0                | 0.0                 | +1.1                  |
| 26.0                   | 26.0                | 0.0                 | +1.1                  |
| 25.0                   | 25.0                | 0.0                 | +1.1                  |
| 24.0                   | 24.0                | 0.0                 | +1.1                  |
| 23.0                   | 23.0                | 0.0                 | +1.1                  |
| 22.0                   | 22.0                | 0.0                 | +1.1                  |
| 21.0                   | 21.0                | 0.0                 | +1.1                  |
| 20.0                   | 20.0                | 0.0                 | +1.1                  |
| 19.0                   | 19.0                | 0.0                 | +1.1                  |
| 18.0                   | 18.0                | 0.0                 | +1.1                  |
| 17.0                   | 17.0                | 0.0                 | +1.1                  |
| 16.0                   | 16.0                | 0.0                 | +1.1                  |
| 15.0                   | 15.0                | 0.0                 | +1.1                  |
| 14.0                   | 14.0                | 0.0                 | +1.1                  |
| 13.0                   | 13.0                | 0.0                 | +1.1                  |
| 12.0                   | 12.0                | 0.0                 | +1.1                  |
| 11.0                   | 11.0                | 0.0                 | +1.1                  |
| 10.0                   | 10.0                | 0.0                 | +1.1                  |
| 9.0                    | 9.0                 | 0.0                 | +1.1                  |
| 8.0                    | 8.0                 | 0.0                 | +1.1                  |
| 7.0                    | 7.0                 | 0.0                 | +1.1                  |
| 6.0                    | 6.0                 | 0.0                 | +1.1                  |
| 5.0                    | 5.0                 | 0.0                 | +1.1                  |
| 4.0                    | 4.0                 | 0.0                 | +1.1                  |
| 3.0                    | 3.0                 | 0.0                 | +1.1                  |
| 2.0                    | 2.0                 | 0.0                 | +1.1                  |
| 1.0                    | 1.0                 | 0.0                 | +1.1                  |
| 0.0                    | 0.0                 | 0.0                 | +1.1                  |

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## 8. Level accuracy including the level range control

| Range | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|-------|------------------------|---------------------|---------------------|-----------------------|
| Auto  | 94.0                   | 94.0                | 0.0                 | +1.1                  |

## 9. Time base response

| Time base duration, Th | Cycle | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|------------------------|-------|------------------------|---------------------|---------------------|-----------------------|
| Fast                   | 2     | 94.0                   | 94.0                | 0.0                 | +1.1                  |
| Slow                   | 2     | 94.0                   | 94.0                | 0.0                 | +1.1                  |
| SEL                    | 2     | 94.0                   | 94.0                | 0.0                 | +1.1                  |

## 10. Peak C-weight level

| Number of cycle | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|-----------------|------------------------|---------------------|---------------------|-----------------------|
| 10              | 94.0                   | 94.0                | 0.0                 | +1.1                  |
| 100             | 94.0                   | 94.0                | 0.0                 | +1.1                  |
| 1000            | 94.0                   | 94.0                | 0.0                 | +1.1                  |
| 10000           | 94.0                   | 94.0                | 0.0                 | +1.1                  |

| Number of cycle | Anticipated Value (dB) | Measured Value (dB) | Deviated Value (dB) | Acceptance Limit (dB) |
|-----------------|------------------------|---------------------|---------------------|-----------------------|
| 10              | 94.0                   | 94.0                | 0.0                 | +1.1                  |
| 100             | 94.0                   | 94.0                | 0.0                 | +1.1                  |
| 1000            | 94.0                   | 94.0                | 0.0                 | +1.1                  |
| 10000           | 94.0                   | 94.0                | 0.0                 | +1.1                  |

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## Result of calibration :

## 1. Absolute sensitivity

| Reference<br>Acoustic signal<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>(dB) | Acceptance<br>Limits<br>(dB) |
|--------------------------------------|---------------------------|-------------------|------------------------------|
| 93.9 (93.8)                          | 93.9                      | 0.0               | ±0.3                         |

## 2. Self-generated noise

| Measured Value<br>(dB) |
|------------------------|
| 93.8                   |

3.2 The microphone of the sound level meter was replaced by a new microphone during

| Frequency<br>Weighting | Measured value<br>(dB) |
|------------------------|------------------------|
| A-weight               | 11.8                   |
| C-weight               | 17.8                   |
| Flat                   | 23.3                   |

## 3. Acoustic signal tests of frequency weightings

New 1/3 octave acoustic response at a level of 93.8 dB

| Frequency<br>(Hz) | Deviation from various frequency weighting response curve (dB) |          |          |                    |
|-------------------|--|----------|----------|--------------------|
|                   | Flat   | A-weight | C-weight | Accuracy<br>Limits |
| 125               | 0.0  | 0.0      | 0.0      | +1.2               |
| 1000              | 0.0  | 0.0      | 0.0      | +1.0               |
| 8000              | 1.1  | 1.1      | 1.1      | +5.0               |

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## 4. Level linearity (including the level range control)

| Range | Anticipated<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits<br>(dB) |
|-------|------------------------------|---------------------------|----------------------------|------------------------------|
| Audio | 94.0                         | 94.0                      | 0.0                        | ±1.1                         |

## 5. Time based response

| Time<br>Weighting | Time based<br>duration, T <sub>b</sub><br>(ms) | Cycle | Anticipated<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits<br>(dB) |
|-------------------|--|-------|------------------------------|---------------------------|----------------------------|------------------------------|
| Fast              | 0.25   | 1     | 104.9                        | 107.9                     | 0.1                        | 1.5-5.0                      |
|                   | 2  | 8     | 112.0                        | 112.0                     | 0.0                        | 1.0-2.5                      |
|                   | 200  | 800   | 124.0                        | 124.0                     | 0.0                        | ±1.0                         |
| Slow              | 2  | 8     | 104.0                        | 104.0                     | 0.0                        | 1.5-5.0                      |
|                   | 200  | 800   | 127.4                        | 127.4                     | 0.0                        | ±1.0                         |
|                   | 0.25   | 1     | 99.0                         | 99.0                      | 0.1                        | 1.5-5.0                      |
| SIL               | 2  | 8     | 104.0                        | 104.0                     | 0.0                        | 1.0-2.5                      |
|                   | 200  | 800   | 128.0                        | 128.0                     | 0.0                        | ±1.0                         |

## 6. Peak to average level

| Number of cycle<br>in<br>test signal | Anticipated<br>Value<br>(dB) | Measured<br>Value, 1/3 octave<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits<br>(dB) |
|--------------------------------------|------------------------------|---------------------------------------|----------------------------|------------------------------|
| Continuous                           | 113.0                        | 113.1                                 | 0.0                        | ±0.9                         |
| One                                  | 116.4                        | 116.5                                 | 0.0                        | ±0.9                         |

| Number of cycle<br>in<br>test signal | Anticipated<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits<br>(dB) |
|--------------------------------------|------------------------------|---------------------------|----------------------------|------------------------------|
| Continuous                           | 113.0                        | 113.1                     | 0.0                        | ±0.9                         |
| Positive half cycle                  | 116.4                        | 116.5                     | 0.0                        | ±0.9                         |
| Negative half cycle                  | 113.4                        | 113.2                     | -0.2                       | ±0.9                         |

Lab 312 Calibration

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## 4. Electrical signal tests of frequency weightings

Weighting network response with reference to 1 kHz

| Frequency<br>(Hz) | Flat | C-weight | A-weight | Acceptance<br>Limits |
|-------------------|------|----------|----------|----------------------|
| 125               | 0.0  | -0.1     | 0.0      | ±0.9                 |
| 250               | 0.0  | 0.0      | 0.0      | ±0.9                 |
| 500               | 0.0  | 0.0      | 0.0      | ±0.9                 |
| 1000              | 0.0  | 0.0      | 0.0      | ±0.9                 |
| 2000              | 0.0  | 0.0      | 0.0      | ±0.9                 |
| 4000              | 0.0  | 0.0      | 0.0      | ±0.9                 |
| 8000              | 0.0  | 0.1      | 0.1      | ±0.9                 |

## 5. Frequency and time weightings at 1 kHz

| Frequency<br>Weighting | Anticipated<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits<br>(dB) |
|------------------------|------------------------------|---------------------------|----------------------------|------------------------------|
| A-weight               | 93.8                         | 93.8                      | 0.0                        | ±0.2                         |
| C-weight               | 94.0                         | 94.0                      | 0.0                        | ±0.2                         |
| Flat                   | 94.0                         | 94.0                      | 0.0                        | ±0.2                         |

## 5.2 Time weighting at 1 kHz

| Frequency<br>Weighting | Anticipated<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits<br>(dB) |
|------------------------|------------------------------|---------------------------|----------------------------|------------------------------|
| Fast                   | 94.0                         | 94.0                      | 0.0                        | ±0.2                         |
| Slow                   | 94.0                         | 94.0                      | 0.0                        | ±0.2                         |
| Imp                    | 94.0                         | 94.0                      | 0.0                        | ±0.2                         |

## 6. Long-term stability

| Frequency<br>Weighting | SIL (1/3 octave)<br>at fixed<br>(dB) | SIL Display<br>at fixed<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits<br>(dB) |
|------------------------|--------------------------------------|---------------------------------|----------------------------|------------------------------|
| A-weight               | 94.0                                 | 94.0                            | 0.0                        | ±0.2                         |

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## 11. Overload indication

| Measured value (dB)       | Deviation<br>Value<br>(dB) | Acceptance<br>Limits<br>(dB) |
|---------------------------|----------------------------|------------------------------|
| Present<br>measured cycle | 95.0                       | ±1.5                         |

## 12. High level stability

| Frequency<br>Weighting | SIL Display<br>at fixed<br>(dB) | SIL Display<br>at fixed<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits<br>(dB) |
|------------------------|---------------------------------|---------------------------------|----------------------------|------------------------------|
| A-weight               | 117.0                           | 117.0                           | 0.0                        | ±0.3                         |

The reported deviation is based on a standard uncertainty multiplied by coverage factor k = 2  
to give values following calibration providing a level of confidence of approximately 95 %

End of Calibration Certificate

Lab 312 Calibration

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## 7. Level linearity on the reference level range

| Anticipated<br>Value<br>(dB) | Measured<br>Value<br>(dB) | Deviation<br>Value<br>(dB) | Acceptance<br>Limits<br>(dB) |
|------------------------------|---------------------------|----------------------------|------------------------------|
| 117.0                        | 117.0                     | 0.0                        | ±1.1                         |
| 116.0                        | 116.0                     | 0.0                        | ±1.1                         |
| 115.0                        | 115.0                     | 0.0                        | ±1.1                         |
| 114.0                        | 114.0                     | 0.0                        | ±1.1                         |
| 113.0                        | 113.0                     | 0.0                        | ±1.1                         |
| 112.0                        | 112.0                     | 0.0                        | ±1.1                         |
| 111.0                        | 111.0                     | 0.0                        | ±1.1                         |
| 110.0                        | 110.0                     | 0.0                        | ±1.1                         |
| 109.0                        | 109.0                     | 0.0                        | ±1.1                         |
| 108.0                        | 108.0                     | 0.0                        | ±1.1                         |
| 107.0                        | 107.0                     | 0.0                        | ±1.1                         |
| 106.0                        | 106.0                     | 0.0                        | ±1.1                         |
| 105.0                        | 105.0                     | 0.0                        | ±1.1                         |
| 104.0                        | 104.0                     | 0.0                        | ±1.1                         |
| 103.0                        | 103.0                     | 0.0                        | ±1.1                         |
| 102.0                        | 102.0                     | 0.0                        | ±1.1                         |
| 101.0                        | 101.0                     | 0.0                        | ±1.1                         |
| 100.0                        | 100.0                     | 0.0                        | ±1.1                         |
| 99.0                         | 99.0                      | 0.0                        | ±1.1                         |
| 98.0                         | 98.0                      | 0.0                        | ±1.1                         |
| 97.0                         | 97.0                      | 0.0                        | ±1.1                         |
| 96.0                         | 96.0                      | 0.0                        | ±1.1                         |
| 95.0                         | 95.0                      | 0.0                        | ±1.1                         |
| 94.0                         | 94.0                      | 0.0                        | ±1.1                         |
| 93.0                         | 93.0                      | 0.0                        | ±1.1                         |
| 92.0                         | 92.0                      | 0.0                        | ±1.1                         |
| 91.0                         | 91.0                      | 0.0                        | ±1.1                         |
| 90.0                         | 90.0                      | 0.0                        | ±1.1                         |
| 89.0                         | 89.0                      | 0.0                        | ±1.1                         |
| 88.0                         | 88.0                      | 0.0                        | ±1.1                         |
| 87.0                         | 87.0                      | 0.0                        | ±1.1                         |
| 86.0                         | 86.0                      | 0.0                        | ±1.1                         |
| 85.0                         | 85.0                      | 0.0                        | ±1.1                         |
| 84.0                         | 84.0                      | 0.0                        | ±1.1                         |
| 83.0                         | 83.0                      | 0.0                        | ±1.1                         |
| 82.0                         | 82.0                      | 0.0                        | ±1.1                         |
| 81.0                         | 81.0                      | 0.0                        | ±1.1                         |
| 80.0                         | 80.0                      | 0.0                        | ±1.1                         |
| 79.0                         | 79.0                      | 0.0                        | ±1.1                         |
| 78.0                         | 78.0                      | 0.0                        | ±1.1                         |
| 77.0                         | 77.0                      | 0.0                        | ±1.1                         |
| 76.0                         | 76.0                      | 0.0                        | ±1.1                         |
| 75.0                         | 75.0                      | 0.0                        | ±1.1                         |
| 74.0                         | 74.0                      | 0.0                        | ±1.1                         |
| 73.0                         | 73.0                      | 0.0                        | ±1.1                         |
| 72.0                         | 72.0                      | 0.0                        | ±1.1                         |
| 71.0                         | 71.0                      | 0.0                        | ±1.1                         |
| 70.0                         | 70.0                      | 0.0                        | ±1.1                         |
| 69.0                         | 69.0                      | 0.0                        | ±1.1                         |
| 68.0                         | 68.0                      | 0.0                        | ±1.1                         |
| 67.0                         | 67.0                      | 0.0                        | ±1.1                         |
| 66.0                         | 66.0                      | 0.0                        | ±1.1                         |
| 65.0                         | 65.0                      | 0.0                        | ±1.1                         |
| 64.0                         | 64.0                      | 0.0                        | ±1.1                         |
| 63.0                         | 63.0                      | 0.0                        | ±1.1                         |
| 62.0                         | 62.0                      | 0.0                        | ±1.1                         |
| 61.0                         | 61.0                      | 0.0                        | ±1.1                         |
| 60.0                         | 60.0                      | 0.0                        | ±1.1                         |
| 59.0                         | 59.0                      | 0.0                        | ±1.1                         |
| 58.0                         | 58.0                      | 0.0                        | ±1.1                         |
| 57.0                         | 57.0                      | 0.0                        | ±1.1                         |
| 56.0                         | 56.0                      | 0.0                        | ±1.1                         |
| 55.0                         | 55.0                      | 0.0                        | ±1.1                         |
| 54.0                         | 54.0                      | 0.0                        | ±1.1                         |
| 53.0                         | 53.0                      | 0.0                        | ±1.1                         |
| 52.0                         | 52.0                      | 0.0                        | ±1.1                         |
| 51.0                         | 51.0                      | 0.0                        | ±1.1                         |
| 50.0                         | 50.0                      | 0.0                        | ±1.1                         |
| 49.0                         | 49.0                      | 0.0                        | ±1.1                         |
| 48.0                         | 48.0                      | 0.0                        | ±1.1                         |
| 47.0                         | 47.0                      | 0.0                        | ±1.1                         |
| 46.0                         | 46.0                      | 0.0                        | ±1.1                         |
| 45.0                         | 45.0                      | 0.0                        | ±1.1                         |
| 44.0                         | 44.0                      | 0.0                        | ±1.1                         |
| 43.0                         | 43.0                      | 0.0                        | ±1.1                         |
| 42.0                         | 42.0                      | 0.0                        | ±1.1                         |
| 41.0                         | 41.0                      | 0.0                        | ±1.1                         |
| 40.0                         | 40.0                      | 0.0                        | ±1.1                         |
| 39.0                         | 39.0                      | 0.0                        | ±1.1                         |
| 38.0                         | 38.0                      | 0.0                        | ±1.1                         |
| 37.0                         | 37.0                      | 0.0                        | ±1.1                         |
| 36.0                         | 36.0                      | 0.0                        | ±1.1                         |
| 35.0                         | 35.0                      | 0.0                        | ±1.1                         |
| 34.0                         | 34.0                      | 0.0                        | ±1.1                         |
| 33.0                         | 33.0                      | 0.0                        | ±1.1                         |
| 32.0                         | 32.0                      | 0.0                        | ±1.1                         |
| 31.0                         | 31.0                      | 0.0                        | ±1.1                         |
| 30.0                         | 30.0                      | 0.0                        | ±1.1                         |
| 29.0                         | 29.0                      | 0.0                        | ±1.1                         |
| 28.0                         | 28.0                      | 0.0                        | ±1.1                         |
| 27.0                         | 27.0                      | 0.0                        | ±1.1                         |
| 26.0                         | 26.0                      | 0.0                        | ±1.1                         |
| 25.0                         | 25.0                      | 0.0                        | ±1.1                         |
| 24.0                         | 24.0                      | 0.0                        | ±1.1                         |
| 23.0                         | 23.0                      | 0.0                        | ±1.1                         |
| 22.0                         | 22.0                      | 0.0                        | ±1.1                         |
| 21.0                         | 21.0                      | 0.0                        | ±1.1                         |
| 20.0                         | 20.0                      | 0.0                        | ±1.1                         |
| 19.0                         | 19.0                      | 0.0                        | ±1.1                         |
| 18.0                         | 18.0                      | 0.0                        | ±1.1                         |
| 17.0                         | 17.0                      | 0.0                        | ±1.1                         |
| 16.0                         | 16.0                      | 0.0                        | ±1.1                         |
| 15.0                         | 15.0                      | 0.0                        | ±1.1                         |
| 14.0                         | 14.0                      | 0.0                        | ±1.1                         |
| 13.0                         | 13.0                      | 0.0                        | ±1.1                         |
| 12.0                         | 12.0                      | 0.0                        | ±1.1                         |
| 11.0                         | 11.0                      | 0.0                        | ±1.1                         |
| 10.0                         | 10.0                      | 0.0                        | ±1.1                         |
| 9.0                          | 9.0                       | 0.0                        | ±1.1                         |
| 8.0                          | 8.0                       | 0.0                        | ±1.1                         |
| 7.0                          | 7.0                       | 0.0                        | ±1.1                         |
| 6.0                          | 6.0                       | 0.0                        | ±1.1                         |
| 5.0                          | 5.0                       | 0.0                        | ±1.1                         |
| 4.0                          | 4.0                       | 0.0                        | ±1.1                         |
| 3.0                          | 3.0                       | 0.0                        | ±1.1                         |
| 2.0                          | 2.0                       | 0.0                        | ±1.1                         |
| 1.0                          | 1.0                       | 0.0                        | ±1.1                         |
| 0.0                          | 0.0                       | 0.0                        | ±1.1                         |

## CERTIFICATE OF CALIBRATION

ISSUED BY : Cirrus Research plc

DATE OF ISSUE : 21 March 2024

CERTIFICATE NUMBER : 215862

Cirrus Research plc  
Acoustic House  
Brindlington Road  
Huddersfield  
North Yorkshire  
YO14 0PH  
United KingdomPage 1 of 2  
Electronic signature  
N Smith  
(Electronically signed)

## doseBadge Reader : IEC 60942:2003

Instrument Information

Manufacturer : Cirrus Research plc

Model : RC 110A

Serial number : 86100

Class : 2

Date of calibration : 21 March 2024

The doseBadge reader detailed above has been calibrated to the published data as described in the operating manual and in the full test configuration. The procedures and techniques used are as described in IEC 60942:2003 Annex B - Periodic Tests and three determinations of the sound pressure level frequency and total deviation were made.

The sound pressure level was measured using a WS21 condenser microphone type MK224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer's data.

The doseBadge Reader has been shown to conform to the Class 2 requirements for periodic testing, described in Annex B of IEC 60942:2003 for the sound pressure level and Posture/Postion limits. For the environmental conditions under which the tests were performed.

However, as public evidence was not available from a testing organisation independent of pattern approval, to demonstrate that the model of doseBadge Reader conforms to the requirements for pattern approval described in Annex A of IEC 60942:2003, no general statement or declaration can be made about the performance of the doseBadge Reader to the requirements of IEC 60942:2003.

Notes

The certificate provides traceability of measurement to the SI system of units and is valid for measurement reported at the National Physical Laboratory or other National Metrology Institute. This certificate may not be used as evidence for the accuracy of the measurement reported at the National Physical Laboratory or other National Metrology Institute. The results within this certificate are valid for the duration of the validity period stated on the certificate. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

## CERTIFICATE OF CALIBRATION

Certificate Number  
215863  
Page 2 of 2

## Environmental conditions

The following conditions were recorded at the time of the test:  
Before Pressure: 100.86 kPa Temperature: 22.2 °C Humidity: 45.5 %  
After Pressure: 100.86 kPa Temperature: 22.2 °C Humidity: 45.5 %

## Test equipment

| Equipment             | Manufacturer    | Model | Serial number |
|-----------------------|-----------------|-------|---------------|
| Description Meter     | Kettley         | 2015  | 033625        |
| Acoustic Calibrator   | Briel and Kjaer | 4231  | 261255        |
| Environmental Monitor | Comet           | 77910 | 21582628      |

## Initial Acoustic Results

|                | Expected | Sample 1 | Sample 2 | Sample 3 | Average | Deviation | Tolerance | Uncertainty |
|----------------|----------|----------|----------|----------|---------|-----------|-----------|-------------|
| Level (dB)     | 114.00   | 114.13   | 114.11   | 114.12   | 114.12  | 0.12      | ±0.75     | 0.11 dB     |
| Deviation (%)  | +4.00    | 0.21     | 0.25     | 0.22     | 0.23    | 0.23      | +4.00     | 0.13 %      |
| Frequency (Hz) | 1000.0   | 1000.2   | 1000.2   | 1000.2   | 1000.2  | 0.2       | ±20.0     | 0.1 Hz      |

The measured quantities or deviations (as applicable) extended by the expanded combined uncertainty of measurement, must not exceed the corresponding tolerance.

## Adjusted Acoustic Results

|                | Expected | Sample 1 | Sample 2 | Sample 3 | Average | Deviation | Tolerance | Uncertainty |
|----------------|----------|----------|----------|----------|---------|-----------|-----------|-------------|
| Level (dB)     | 114.00   | 113.99   | 114.00   | 114.01   | 114.00  | 0.00      | ±0.75     | 0.11 dB     |
| Deviation (%)  | +4.00    | 0.21     | 0.23     | 0.21     | 0.22    | 0.22      | +4.00     | 0.13 %      |
| Frequency (Hz) | 1000.0   | 1000.1   | 1000.2   | 1000.2   | 1000.3  | 0.2       | ±20.0     | 0.1 Hz      |

## Functionality Results

| Function      | Result |
|---------------|--------|
| Key/Pad       | Pass   |
| Battery Power | Pass   |
| Display       | Pass   |
| Communication | Pass   |
| 2-way IR link | Pass   |
| Clock         | Pass   |

End of results

## CERTIFICATE OF CALIBRATION

ISSUED BY : Cirrus Research plc

DATE OF ISSUE : 07 May 2024

CERTIFICATE NUMBER : 215786

Cirrus Research plc  
Acoustic House  
Brindlington Road  
Huddersfield  
North Yorkshire  
YO14 0PH  
United KingdomPage 1 of 2  
Electronic signature  
N Smith  
(Electronically signed)

















TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
154/1 PATTANAKARN ROAD 25/18, SUKHUMVIT, BANGKOK 10250
TEL: 02-2711-3000 TO FAX 02-2711-8444

Cert. No.: 24CJ052
Page: 1 of 2

### Certificate of Calibration

Equipment: pH Meter
Manufacturer: Mettler Toledo
Model: SevenGo
Serial No.: B863912470
ID No.: B863912470
Condition As-Received: BOK, L00031
Received Date: 23 February 2024
Calibration Date: 26 February 2024
Reference: 24CJ-070705C-13
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan Rd., Phatthanakan Rd., Klongkum Phatthanakan, Klongkum Phatthanakan, Bangkok 10250 Thailand

Calibrated by: Uthair Kankul
Approved by: Suthep Maungmae
Issue Date: 26 February 2024

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

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
154/1 PATTANAKARN ROAD 25/18, SUKHUMVIT, BANGKOK 10250
TEL: 02-2711-3000 TO FAX 02-2711-8444

Cert. No.: 24CJ052
Page: 2 of 2

### Certificate of Calibration

Equipment: pH Meter with Sensor
Manufacturer: Mettler Toledo
Model: SevenGo
Serial No.: B863912470
ID No.: B863912470
Condition As-Received: BOK, L00031
Received Date: 23 February 2024
Calibration Date: 26 February 2024
Reference: 24CJ-070705C-13
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan Rd., Phatthanakan Rd., Klongkum Phatthanakan, Klongkum Phatthanakan, Bangkok 10250 Thailand

Calibrated by: Uthair Kankul
Approved by: Suthep Maungmae
Issue Date: 26 February 2024

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

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
154/1 PATTANAKARN ROAD 25/18, SUKHUMVIT, BANGKOK 10250
TEL: 02-2711-3000 TO FAX 02-2711-8444

Cert. No.: 24L007
Page: 1 of 2

### Certificate of Calibration

Equipment: pH Meter with Sensor
Manufacturer: Mettler Toledo
Model: SevenGo
Serial No.: B863912470
ID No.: B863912470
Condition As-Received: BOK, L00031
Received Date: 23 February 2024
Calibration Date: 26 February 2024
Reference: 24CJ-070705C-13
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan Rd., Phatthanakan Rd., Klongkum Phatthanakan, Klongkum Phatthanakan, Bangkok 10250 Thailand

Calibrated by: Uthair Kankul
Approved by: Suthep Maungmae
Issue Date: 26 February 2024

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

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
154/1 PATTANAKARN ROAD 25/18, SUKHUMVIT, BANGKOK 10250
TEL: 02-2711-3000 TO FAX 02-2711-8444

Cert. No.: 24L007
Page: 2 of 2

### Certificate of Calibration

Equipment: pH Meter with Sensor
Manufacturer: Mettler Toledo
Model: SevenGo
Serial No.: B863912470
ID No.: B863912470
Condition As-Received: BOK, L00031
Received Date: 23 February 2024
Calibration Date: 26 February 2024
Reference: 24CJ-070705C-13
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan Rd., Phatthanakan Rd., Klongkum Phatthanakan, Klongkum Phatthanakan, Bangkok 10250 Thailand

Calibrated by: Uthair Kankul
Approved by: Suthep Maungmae
Issue Date: 26 February 2024

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

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
154/1 PATTANAKARN ROAD 25/18, SUKHUMVIT, BANGKOK 10250
TEL: 02-2711-3000 TO FAX 02-2711-8444

Cert. No.: 23TV042
Page: 1 of 2

### Certificate of Testing

Equipment: DO Meter
Manufacturer: YSI
Model: 9000 ZDO
Serial No.: 06011147
ID No.: BAK, EN0017
Received Date: 16 November 2023
Test Date: 16 November 2023
Reference: 23TV-000205C-4
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan Rd., Phatthanakan Rd., Klongkum Phatthanakan, Klongkum Phatthanakan, Bangkok 10250 Thailand

Calibrated by: Uthair Kankul
Approved by: Suthep Maungmae
Issue Date: 17 November 2023

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

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
154/1 PATTANAKARN ROAD 25/18, SUKHUMVIT, BANGKOK 10250
TEL: 02-2711-3000 TO FAX 02-2711-8444

Cert. No.: 23TV042
Page: 2 of 2

### Certificate of Testing

Equipment: DO Meter
Manufacturer: YSI
Model: 9000 ZDO
Serial No.: 06011147
ID No.: BAK, EN0017
Received Date: 16 November 2023
Test Date: 16 November 2023
Reference: 23TV-000205C-4
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan Rd., Phatthanakan Rd., Klongkum Phatthanakan, Klongkum Phatthanakan, Bangkok 10250 Thailand

Calibrated by: Uthair Kankul
Approved by: Suthep Maungmae
Issue Date: 17 November 2023

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

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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154/1 PATTANAKARN ROAD 25/18, SUKHUMVIT, BANGKOK 10250
TEL: 02-2711-3000 TO FAX 02-2711-8444

Cert. No.: 23L006
Page: 1 of 2

### Certificate of Calibration

Equipment: DO Meter with Sensor
Manufacturer: YSI
Model: 9000 ZDO
Serial No.: 06011147
ID No.: BAK, EN0017
Received Date: 16 November 2023
Test Date: 16 November 2023
Reference: 23TV-000205C-4
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan Rd., Phatthanakan Rd., Klongkum Phatthanakan, Klongkum Phatthanakan, Bangkok 10250 Thailand

Calibrated by: Uthair Kankul
Approved by: Suthep Maungmae
Issue Date: 17 November 2023

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

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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154/1 PATTANAKARN ROAD 25/18, SUKHUMVIT, BANGKOK 10250
TEL: 02-2711-3000 TO FAX 02-2711-8444

Cert. No.: 23L006
Page: 2 of 2

### Certificate of Calibration

Equipment: DO Meter with Sensor
Manufacturer: YSI
Model: 9000 ZDO
Serial No.: 06011147
ID No.: BAK, EN0017
Received Date: 16 November 2023
Test Date: 16 November 2023
Reference: 23TV-000205C-4
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan Rd., Phatthanakan Rd., Klongkum Phatthanakan, Klongkum Phatthanakan, Bangkok 10250 Thailand

Calibrated by: Uthair Kankul
Approved by: Suthep Maungmae
Issue Date: 17 November 2023

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

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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Cert. No.: 23L006
Page: 2 of 2

### Certificate of Calibration

Equipment: DO Meter with Sensor
Manufacturer: YSI
Model: 9000 ZDO
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ID No.: BAK, EN0017
Received Date: 16 November 2023
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The uncertainties are for a confidence probability of approximately 95%.





Sartorius (Thailand) Co., Ltd.  
Unit 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

SCG Metrology  
SCI ECO Services Company Limited  
332 Moo 3, T. Bangae, A. Klongkiet, Saraburi 18112, Thailand  
Saraburi Tel : +66 3527 2196 Fax : +66 3527 2190  
Bangkok Tel : +66 8 9205 6851 +66 8 247 2368  
Website : www.scorp.co.th E-Mail : calinfo@scg.com

Certificate No. T24994 Page 1 of 3

### Certificate of Calibration

Equipment : Chamber ( Oven )  
Manufacturer : Memmert  
Model : UF 450  
Serial No. : B717.0531  
Customer Code : BKK\_EN0273  
ID No. : 1804244  
Customer : AIS Laboratory Group (Thailand) Co., Ltd.  
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,  
Khet Suan I uang, Bangkok 10250

Customer Location : Laboratory (Oven Room)  
Date of Receipt : 08 May 2024  
Calibrated By : Preecha Phitsaithikul (Temperature Calibration Manager)  
Approved By : [Signature] / Nofan Sungsueh (Metrology Manager)  
Date of Issue : 13 May 2024

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has announced the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrology.

SCG Metrology  
SCI ECO Services Company Limited  
332 Moo 3, T. Bangae, A. Klongkiet, Saraburi 18112, Thailand

Certificate No. T24994 Page 1 of 3

### Calibration Report

Equipment : Chamber ( Oven )  
Date of Calibration : 14 May 2024  
Environment : Temperature : 26.5 ± 0.1 °C  
Line Voltage : 236.7 ± 2.8 V  
Relative Humidity : 51 ± 5 % RH

Conditions of this results of calibration :

- The equipment was calibrated by the Metrology Department of the customer (AIS Laboratory Group) in accordance with the requirements of the Thai Laboratory Accreditation Scheme for ambient temperature measurement. The calibration was done in accordance with WI 720 (based on ASTM E145-94 (Reapproved 2001) and AS1853 (1996)). All data shown below were final values and the actual data from customer request. The temperature value used was based on ITS-90.
- Reference Standard from customer :  
Instrument Model Instrument No. Certificate No. Due Date  
RTD 100 ohm 1231955 17 November 2024  
DATA LOGGER 14990A 1231955 17 November 2024
- The certificate is traceable to : National Institute of Metrology (Thailand) through Metrology Center (MSC TSD-TIS 1625 CALIBRATION 0244)
- Condition of calibrated item : good  
Equipment Description :  
Type : Chamber : Hour 30 Minute At 104 °C  
Fresh Air Damper : ☐ Open ☒ Close ☐ Medium ☐ Max  
☒ Not Available
- Adjustment : ☒ X ☐ without adjustment ☐ after adjustment

Approved By : [Signature]

SCG Metrology  
SCI ECO Services Company Limited  
332 Moo 3, T. Bangae, A. Klongkiet, Saraburi 18112, Thailand

Certificate No. T24994 Page 3 of 3

### Calibration Report

Equipment : Liquid Bath ( Water )  
Manufacturer : MEMMERT  
Model : WNB29  
Serial No. : L611.0135  
Customer Code : BKK\_EN0148  
ID No. : 1645544  
Customer : AIS Laboratory Group (Thailand) Co., Ltd.  
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,  
Khet Suan I uang, Bangkok 10250

Customer Location : ORGANIC PREPARATION LAB  
Date of Receipt : 27 June 2023  
Calibrated By : Sujjar Nakkared (Site Calibration Manager)  
Approved By : [Signature] / Hoonchai Suriswong (Site Calibration Manager)  
Date of Issue : 11 Jul 2023

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

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Certificate No. T24994 Page 3 of 3

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ID No. : 1645544  
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Certificate No. T24994 Page 3 of 3

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Certificate No. T24994 Page 3 of 3

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Certificate No. T24994 Page 3 of 3

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Certificate No. T24994 Page 3 of 3

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Agustin Casado de Cienfuegos, Bahama

Date: December 12, 2023 1:54 PM  
 Version: 1.0  
 Page: 10 of 10

Agnew Consulting Compliance Services

Agilent G1061A-00 Compliance Services

Date: \_\_\_\_\_ Use answer 1-20 on PS1  
 Revision 01: CH 7

System Universal Employment Services

State: California 1/27/2019 6:44 PM  
 Request ID: 1267  
 Page 11 of 18





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Date: April 29 2023 2:53:07 PM  
System ID: 5543  
User: IT-10

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Date: Apr 25, 2023 9:52:01 PM  
 System ID: (A)-3  
 Page 13 of 18

and, second, whether the *in vitro* results are consistent with the *in vivo* results.

Date: Apr 22 2025 3:53:07 PM  
System ID: QM3  
Page 10 of 14

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|     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|
| Jul | Aug | Sep | Oct | Nov | Dec |
|     |     |     |     |     |     |

|   | 049                      | 1334                     | Photo                    |
|---|--------------------------|--------------------------|--------------------------|
| 1.Digital-wash tubing change                              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.ISE tubing change                                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.Syringe check/change                                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.Dependent check/ change                                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5.Wash tubing change when necessary                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6.Lung check/change                                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7.H+Hr pebble/particle change(not Kahlis20)               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8.ISE needles check/change                                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9.Pump tubing check/ change                               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10.Brush/tear out part check/ change                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11.Peristaltic pump check /oiling/lubrication             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12.Heating check  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13.Cooling check  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14.Dimmer neohime check/adjustment                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15.Candle transfer mechanic check/adjustment              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16.Dimmer treatment check/adjustment                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17.Sample/sensor register check/adjustment                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18.Dispersing tubing lightning check                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19.Protectant and optics cleaning/check/adjustment        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20.Wavelength IC cleaning if necessary                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21.Mechanic cleaning/lubrication                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22.Instrument IC if necessary                             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23.Complete analyzer testing with waterblank/QC or sample | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24.Test parameters/Adjustment/Control. Save to USB key    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. UPS test  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Phone: Res Lab Instrument: RSC Agilent  
 Date/Time: 10/1/02 Serial no: 50291  
 Service done by: DPZ Install date:  
 Signature of customer: guy jin Date/Time: 10/1/02

[illegible][illegible]

|                       |                    |                 |                   |
|-----------------------|--------------------|-----------------|-------------------|
| Equipment             | CONDUCTIVITY METER | Certificate No. | 02403090          |
| Model                 | ORION STAR A215    | Issued Date     | 25 December 2023  |
| Serial No. (or ID)    | 258331             | Job No.         | WO-00072962       |
| Manufacturer          | Thermo Scientific  | Page            | 1 of 2            |
| Electronic Serial No. | YV1-18418          | Model           | ORION 013056M0    |
| Condition             | In Condition       | Brand           | Thermo Scientific |

|          |  |  |   |  |
|----------|--|--|---|--|
| Customer | ALB Laboratory Group (Thailand) Co., Ltd<br>104 Suk Pitsanum 40, Pitkanum Rd.,<br>Suan Luang, Bangkok 10260 Thailand                                   |  | Sample # <u>                    </u><br>APPROVED BY <u>                    </u><br>DATE <u>15/12/24</u> |  |
|          | Environmental Card No: <u>                    </u><br>Temperature: <u>21.8</u> °C <u>2</u> <u>0.1</u><br>Humidity: <u>53.7</u> %RH <u>2</u> <u>0.1</u> |  | <u>                    </u><br><u>                    </u><br><u>                    </u>               |  |

Calibration Place: ALS Laboratory Group (Thailand) Co., Ltd. (Viet Chemistry Lab 2)  
104 Bx Pattenakorn 42, Pattenakorn Rd.

Calibration By: Mr. Shreyas Sengupta  
Calibration Date: 25 December 2023  
The Method used: In-house method, GC-MS/MS, based on ASTM D 1175-18 and 3159-18  
Traceability: This certificate is traceable to the SI Unit maintained by CRM of NIST (SRM 1970a) through CPA Chem Co., Ltd. (NOMEX 17034) Certificate No. 429262 810  
800492

*S. S. S.*  
(Mr. S. S. S.)

  
 Director

[illegible]

John R. Anderson and John A. Anderson  
 Santa Clara University, California

Delivering Growth + in Asia and Beyond

DOI: 10.1002/for

Calibration Results:

| Standard Conductivity Solution | End User Calibration Reading | Correction        | Coverage Factor (%) | Uncertainty (%) |
|--------------------------------|------------------------------|-------------------|---------------------|-----------------|
| 84.000 $\mu$ S/cm              | 70.84 $\mu$ S/cm             | -1.640 $\mu$ S/cm | 2.36                | 0.88 $\mu$ S/cm |
| 1413.0 $\mu$ S/cm              | 1420 $\mu$ S/cm              | 8.0 $\mu$ S/cm    | 2.36                | 11 $\mu$ S/cm   |
| 12,800 $\mu$ S/cm              | 12,811 $\mu$ S/cm            | 11.0 $\mu$ S/cm   | 2.36                | 8.75 $\mu$ S/cm |

| Source                | Low Linear Estimation | Correction        | Coverage Factor | Uncertainty (%)  |
|-----------------------|-----------------------|-------------------|-----------------|------------------|
| Conductivity Solution |                       |                   |                 |                  |
| 10,000 $\mu$ S/cm     | 14.0% $\mu$ S/cm      | -0.01% $\mu$ S/cm | 2.0%            | 0.44% $\mu$ S/cm |
| 1410.0 $\mu$ S/cm     | 14.4% $\mu$ S/cm      | +0.1% $\mu$ S/cm  | 2.3%            | 1% $\mu$ S/cm    |
| 10,000 mS/cm          | 82.8% mS/cm           | 0.002% mS/cm      | 2.3%            | 0.004% mS/cm     |

### The End of Certificate

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[illegible]

Ms. Suzanne Senechal  
Bismarck, N. Dakota

[illegible]

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# ภาคผนวก จ

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หนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
จากกรมโรงงานอุตสาหกรรม







| ลำดับที่ | สารมลพิษ            | วิธีวิเคราะห์   |
|----------|---------------------|---|
| 19       | Copper              | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 20       | Cyanide             | Distillation, Colorimetric Method <sup>(4)</sup>  |
| 21       | 2,4'-DDD            | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 22       | 4,4'-DDD            | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 23       | 2,4'-DDE            | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 24       | 4,4'-DDE            | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 25       | 2,4'-DDT            | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 26       | 4,4'-DDT            | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 27       | Dieldrin            | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 28       | Endosulfan Sulfate  | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 29       | Endosulfan I        | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 30       | Endosulfan II       | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 31       | Endrin              | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 32       | Endrin Aldehyde     | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 33       | Formaldehyde        | Distillation, Colorimetric Method <sup>(3)</sup>  |
| 34       | Free Chlorine       | 1) DPD Ferrous Titrimetric Method <sup>(4)</sup><br>2) DPD Colorimetric Method <sup>(4)</sup>   |
| 35       | Heptachlor          | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 36       | Heptachlor Epoxide  | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 37       | Hexavalent Chromium | Colorimetric Method <sup>(4)</sup>  |
| 38       | 3-Hydroxycarbofuran | High-Performance Liquid Chromatographic Method <sup>(4)</sup>   |
| 39       | Lead                | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup> |

40 Manganese...

| ลำดับที่ | สารมลพิษ                | วิธีวิเคราะห์   |
|----------|-------------------------|---|
| 40       | Manganese               | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 41       | Mercury                 | 1) Digestion, Cold-Vapor Atomic Absorption<br>Spectrometric Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass spectrometric Method <sup>(4)</sup>  |
| 42       | Methocarb               | High-Performance Liquid Chromatographic Method <sup>(4)</sup>   |
| 43       | Methoxychlor            | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 44       | Methomyl                | High-Performance Liquid Chromatographic Method <sup>(4)</sup>   |
| 45       | Nickel                  | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 46       | Oil & Grease            | 1) Liquid-Liquid, Partition-Gravimetric Method <sup>(4)</sup><br>2) Soxhlet Extraction Method <sup>(4)</sup>  |
| 47       | Oxamyl                  | High-Performance Liquid Chromatographic Method <sup>(4)</sup>   |
| 48       | Propoxur                | High-Performance Liquid Chromatographic Method <sup>(4)</sup>   |
| 49       | pH                      | Electrometric Method <sup>(4)</sup>   |
| 50       | Phenols                 | 1) Distillation, Chloroform Extraction Method <sup>(4)</sup><br>2) Distillation, Direct Photometric Method <sup>(4)</sup>   |
| 51       | Selenium                | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 52       | Sulfide                 | Iodometric Method <sup>(4)</sup>  |
| 53       | Temperature             | Laboratory and Field Methods <sup>(4)</sup>   |
| 54       | Total Dissolved Solids  | Dried at 180 °C <sup>(4)</sup>  |
| 55       | Total Kjeldahl Nitrogen | Semi-Micro Kjeldahl Method <sup>(4)</sup>   |
| 56       | Total Phosphorous       | Digestion, Colorimetric Method <sup>(4)</sup>   |
| 57       | Total Suspended Solids  | Dried from 103-105 °C <sup>(4)</sup>  |
| 58       | Toxaphene               | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 59       | Trivalent Chromium      | 1) Digestion, Inductively Coupled Plasma Method;<br>Colorimetric Method; Calculation <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method; Colorimetric Method;<br>Calculation <sup>(4)</sup> |
| 60       | Zinc                    | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/Mass<br>Spectrometric Method <sup>(4)</sup>  |

น้ำดื่ม...

น้ำดื่ม จำนวน 126 รายการ

| ลำดับที่ | สารมลพิษ                | วิธีวิเคราะห์   |
|----------|-------------------------|---|
| 1        | Acenaphthene            | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 2        | Acetone                 | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 3        | Aldrin                  | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 4        | Anthracene              | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 5        | Antimony                | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 6        | Arsenic                 | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 7        | Atrazine                | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 8        | Barium                  | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 9        | Benz(a)anthracene       | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 10       | Benzene                 | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 11       | Benzo(b)fluoranthene    | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 12       | Benzo(k)fluoranthene    | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 13       | Benzoic Acid            | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 14       | Benzo(a)pyrene          | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 15       | Benzo(g,h,i)perylene    | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 16       | Beryllium               | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 17       | Bis(2-chloroethyl)ether | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |

18 Bis(2-ethylhexyl)phthalate...

| ลำดับที่ | สารมลพิษ                   | วิธีวิเคราะห์   |
|----------|----------------------------|---|
| 18       | Bis(2-ethylhexyl)phthalate | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 19       | Bromodichloromethane       | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 20       | Bromoform                  | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 21       | Butanol                    | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 22       | Butyl benzyl phthalate     | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 23       | Cadmium                    | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 24       | Carbazole                  | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 25       | Carbon disulfide           | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 26       | Carbon tetrachloride       | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 27       | Chlordane                  | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 28       | p-Chloroaniline            | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 29       | Chlorobenzene              | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 30       | Chlorodibromomethane       | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 31       | Chloroform                 | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 32       | 2-Chlorophenol             | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 33       | Chromium                   | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 34       | Chromium (III)             | 1) Digestion, Inductively Coupled Plasma Method;<br>Colorimetric Method; Calculation <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method; Colorimetric Method;<br>Calculation <sup>(4)</sup> |
| 35       | Chromium (VI)              | Colorimetric Method <sup>(4)</sup>  |

36 Chrysene...

| ลำดับที่ | สารเคมี                    | วิธีการตรวจ  |
|----------|----------------------------|--|
| 36       | Chrysene                   | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 37       | Cyanide                    | Distillation, Colorimetric Method <sup>(4)</sup>   |
| 38       | 2,4-D                      | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 39       | DDD                        | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 40       | DDE                        | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 41       | DDT                        | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 42       | Dibenz(a,h)anthracene      | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 43       | Di-n-Butyl Phthalate       | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 44       | 1,2-Dichlorobenzene        | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>           |
| 45       | 1,3-Dichlorobenzene        | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>           |
| 46       | 1,4-Dichlorobenzene        | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>           |
| 47       | 3,3-Dichlorobenzidine      | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 48       | 1,1-Dichloroethane         | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>           |
| 49       | 1,2-Dichloroethane         | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>           |
| 50       | 1,1-Dichloroethylene       | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>           |
| 51       | cis-1,2-Dichloroethylene   | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>           |
| 52       | trans-1,2-Dichloroethylene | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>           |
| 53       | 2,4-Dichlorophenol         | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 54       | 1,2-Dichloropropane        | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>           |
| 55       | 1,3-Dichloropropane        | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>           |

56 1,3-Dichloropropene...

| ลำดับที่ | สารเคมี                  | วิธีการตรวจ  |
|----------|--------------------------|--|
| 56       | 1,3-Dichloropropene      | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>           |
| 57       | Dieldrin                 | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 58       | Diethyl Phthalate        | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 59       | 2,4-Dimethylphenol       | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 60       | 2,4-Dinitrophenol        | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 61       | 2,4-Dinitrotoluene       | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 62       | 2,6-Dinitrotoluene       | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 63       | Di-n-octyl phthalate     | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 64       | Endosulfan               | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 65       | Endrin                   | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 66       | Ethylbenzene             | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>           |
| 67       | Fluoranthene             | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 68       | Fluorene                 | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 69       | Heptachlor               | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 70       | Heptachlor epoxide       | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 71       | Hexachlorobenzene        | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 72       | Hexachloro-1,3-butadiene | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>           |
| 73       | n-Hexane                 | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>           |
| 74       | α-HCH                    | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 75       | β-HCH                    | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |

76 γ-HCH...

| ลำดับที่ | สารเคมี                   | วิธีการตรวจ  |
|----------|---------------------------|--|
| 76       | γ-HCH                     | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 77       | Hexachlorocyclopentadiene | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 78       | Hexachloroethane          | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 79       | Indeno(1,2,3-cd)pyrene    | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 80       | Isophorone                | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 81       | Lead                      | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup>                    |
| 82       | Manganese                 | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup>                    |
| 83       | Mercury                   | 1) Digestion, Cold Vapor Atomic Absorption<br>Spectrometric Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 84       | Methanol                  | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 85       | Methoxychlor              | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 86       | Methyl bromide            | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 87       | Methylene chloride        | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 88       | 2-Methylphenol            | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 89       | 2-Methylnaphthalene       | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 90       | Methyl tert-butyl Ether   | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 91       | Naphthalene               | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 92       | Nickel                    | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup>                    |
| 93       | Nitrobenzene              | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |

94 N-Nitrosodiphenylamine...

| ลำดับที่ | สารเคมี   | วิธีการตรวจ  |
|----------|---|--|
| 94       | N-Nitrosodiphenylamine  | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 95       | N-Nitrosodi-n-Propylamine   | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 96       | Polychlorinated Biphenyls<br>- PCB 1016<br>- PCB 1221<br>- PCB 1232<br>- PCB 1242<br>- PCB 1248<br>- PCB 1254<br>- PCB 1260 | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 97       | Pentachlorophenol   | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 98       | pH  | Electrometric Method <sup>(4)</sup>  |
| 99       | Phenanthrene  | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 100      | Phenol  | 1) Distillation, Chloroform Extraction Method <sup>(4)</sup><br>2) Distillation, Direct Photometric Method <sup>(4)</sup><br>3) Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup> |
| 101      | Pyrene  | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 102      | Selenium  | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 103      | Silver  | 1) Digestion, Inductively Coupled Plasma Method <sup>(4)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(4)</sup>  |
| 104      | Styrene   | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 105      | 1,1,2,2-Tetrachloroethane   | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 106      | Tetrachloroethylene   | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 107      | Toluene   | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 108      | Toxaphene   | Liquid-Liquid Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(4)</sup>   |
| 109      | TPH (C <sub>8</sub> -C <sub>9</sub> )   | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(16,21)</sup>   |

110 TPH (C<sub>8</sub>-C<sub>10</sub>)...



| ลำดับที่ | สารมลพิษ                                | วิธีวิเคราะห์   |
|----------|---|---|
| 110      | TPH (C <sub>8</sub> -C <sub>12</sub> )  | Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(9,22)</sup>  |
| 111      | TPH (C <sub>13</sub> -C <sub>19</sub> ) | Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method <sup>(9,22)</sup>  |
| 112      | 1,2,4-Trichlorobenzene                  | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>  |
| 113      | 1,1,1-Trichloroethane                   | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>  |
| 114      | 1,1,2-Trichloroethane                   | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>  |
| 115      | Trichloroethylene                       | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>  |
| 116      | 2,4,5-Trichlorophenol                   | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>  |
| 117      | 2,4,6-Trichlorophenol                   | Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>  |
| 118      | 1,3,5-Trimethylbenzene                  | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>  |
| 119      | Vanadium                                | 1) Digestion, Inductively Coupled Plasma Method <sup>(3)</sup><br>2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(4)</sup> |
| 120      | Vinyl acetate                           | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>  |
| 121      | Vinyl chloride                          | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>  |
| 122      | m-Xylene                                | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>  |
| 123      | o-Xylene                                | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>  |
| 124      | p-Xylene                                | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>  |
| 125      | Xylene (Total)                          | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(4)</sup>  |
| 126      | Zinc                                    | 1) Digestion, Inductively Coupled Plasma Method <sup>(3)</sup><br>2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(4)</sup> |

อากาศเสีย..

## อากาศเสีย (ปล่องระบาย) จำนวน 28 รายการ

| ลำดับที่ | สารมลพิษ          | วิธีวิเคราะห์   |
|----------|-------------------|---|
| 1        | Antimony          | 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>(3)</sup>   |
| 2        | Arsenic           | 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3)</sup><br>1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>(3)</sup> |
| 3        | Beryllium         | 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3)</sup><br>1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>(3)</sup> |
| 4        | Cadmium           | 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3)</sup><br>1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>(3)</sup> |
| 5        | Carbon Monoxide   | 1) Instrumental Analyzer Method <sup>(3)</sup><br>2) Sampling Bag Non-Dispersive Infrared Method <sup>(3)</sup>   |
| 6        | Chlorine          | 1) Adsorption Sampling, Ion Chromatographic Method <sup>(3)</sup><br>2) Isokinetic Sampling, Ion Chromatographic Method <sup>(3)</sup>  |
| 7        | Chromium          | 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>(3)</sup><br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3)</sup> |
| 8        | Cobalt            | 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>(3)</sup><br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3)</sup> |
| 9        | Copper            | 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>(3)</sup><br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3)</sup> |
| 10       | Cresol            | Adsorption Sampling, Gas Chromatographic Method <sup>(3)</sup>  |
| 11       | Dioxins           | Isokinetic Sampling <sup>(3)</sup>  |
| 12       | Hydrogen Chloride | 1) Adsorption Sampling, Ion Chromatographic Method <sup>(3)</sup><br>2) Isokinetic Sampling, Ion Chromatographic Method <sup>(3)</sup>  |
| 13       | Hydrogen Fluoride | 1) Adsorption Sampling, Ion Chromatographic Method <sup>(3)</sup><br>2) Isokinetic Sampling, Ion Chromatographic Method <sup>(3)</sup>  |
| 14       | Hydrogen Sulfide  | Absorption Sampling, Iodometric Method <sup>(3)</sup>   |

15 Lead..

| ลำดับที่ | สารมลพิษ                    | วิธีวิเคราะห์  |
|----------|-----------------------------|--|
| 15       | Lead                        | 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>(3)</sup><br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3)</sup>                |
| 16       | Manganese                   | 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>(3)</sup><br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3)</sup>                |
| 17       | Mercury                     | 1) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(3)</sup><br>2) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method <sup>(3)</sup> |
| 18       | Nickel                      | 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>(3)</sup><br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3)</sup>                |
| 19       | Opacity                     | Ringelmann's Method <sup>(2)</sup>   |
| 20       | Oxides of Nitrogen          | 1) Adsorption Sampling, Phenoldisulfonic Acid Method <sup>(3)</sup><br>2) Absorption Sampling, Alkaline Permanganate/Colorimetric Method <sup>(3)</sup><br>3) Instrumental Analyzer Method <sup>(3)</sup>    |
| 21       | Selenium                    | 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>(3)</sup><br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3)</sup>                |
| 22       | Sulfur Dioxide              | 1) Absorption Sampling, Barium-Thorin Titrimetric Method <sup>(3)</sup><br>2) Instrumental Analyzer Method <sup>(3)</sup>  |
| 23       | Sulfuric Acid               | Isokinetic Sampling, Barium-Thorin Titrimetric Method <sup>(3)</sup>   |
| 24       | Tellurium                   | 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>(3)</sup><br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3)</sup>                |
| 25       | Tin                         | 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>(3)</sup><br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3)</sup>                |
| 26       | Total Suspended Particulate | 1) Isokinetic Sampling, Gravimetric Method <sup>(3)</sup><br>2) Paired Train, Isokinetic Sampling, Gravimetric Method <sup>(3)</sup>   |

27 Vanadium..

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์   |
|----------|----------|---|
| 27       | Vanadium | 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method <sup>(3)</sup><br>2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(3)</sup> |
| 28       | Xylene   | Adsorption Sampling, Gas Chromatographic Method <sup>(3)</sup>  |

## สิ่งปกคลุมหรือวัสดุที่ฝังไว้ จำนวน 35 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์  |
|----------|----------|--|
| 1        | Aldrin   | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,9,26)</sup><br>2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,26)</sup><br>3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1,26)</sup>                              |
| 2        | Antimony | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,14)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,17)</sup><br>3) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup> |
| 3        | Arsenic  | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,14)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,17)</sup><br>3) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup> |
| 4        | Barium   | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1,6,14)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1,6,17)</sup><br>3) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup> |

5 Beryllium..

| ลำดับที่ | สารเคมี        | วิธีวิเคราะห์  |
|----------|----------------|--|
| 5        | Beryllium      | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.16)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup><br>3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup>   |
| 6        | Cadmium        | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.16)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup><br>3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup>   |
| 7        | Chlordane      | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup><br>2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup><br>3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>   |
| 8        | Chromium       | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.16)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup><br>3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup>   |
| 9        | Chromium (III) | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method <sup>(1.6.16,19)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method <sup>(1.6.17,19)</sup><br>3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>(7.8,16,19)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>(7.8,17,19)</sup> |

10 Chromium (VI)...

| ลำดับที่ | สารเคมี       | วิธีวิเคราะห์  |
|----------|---------------|--|
| 10       | Chromium (VI) | 1) Waste Extraction, Colorimetric Method <sup>(1.6.19)</sup><br>2) Alkaline Digestion, Colorimetric Method <sup>(8.19)</sup>   |
| 11       | Cobalt        | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.16)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup><br>3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup> |
| 12       | Copper        | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.16)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup><br>3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup> |
| 13       | 2,4-D         | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup><br>2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup><br>3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>                             |
| 14       | DDD           | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup><br>2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup><br>3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>                             |
| 15       | DDE           | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup><br>2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup><br>3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>                             |
| 16       | DDT           | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup>   |

2) Soxhlet...

| ลำดับที่ | สารเคมี    | วิธีวิเคราะห์  |
|----------|------------|--|
| 17       | Dieldrin   | 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup><br>3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup><br>1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup><br>2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup><br>3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup> |
| 18       | Endrin     | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup><br>2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup><br>3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>   |
| 19       | Heptachlor | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup><br>2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup><br>3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>   |
| 20       | Lead       | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.16)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup><br>3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup>   |
| 21       | Lindane    | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup><br>2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup><br>3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>   |

22 Mercury...

| ลำดับที่ | สารเคมี  | วิธีวิเคราะห์  |
|----------|--|--|
| 22       | Mercury  | 1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(1.6.20)</sup><br>2) Waste Extraction, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method <sup>(1.6.20)</sup><br>3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>(20)</sup><br>4) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method <sup>(20)</sup><br>5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method <sup>(21)</sup> |
| 23       | Methoxychlor   | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup><br>2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup><br>3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>   |
| 24       | Mirex  | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup><br>2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup><br>3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>   |
| 25       | Molybdenum   | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.16)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup><br>3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup>   |
| 26       | Nickel   | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6.16)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6.17)</sup><br>3) Digestion, Inductively Coupled Plasma Method <sup>(7.14)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7.17)</sup>   |
| 27       | Polychlorinated biphenyls (PCBs)<br>- Aroclor 1016<br>- Aroclor 1221<br>- Aroclor 1232<br>- Aroclor 1242<br>- Aroclor 1248<br>- Aroclor 1254<br>- Aroclor 1260 | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9.24)</sup><br>2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10.26)</sup><br>3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11.26)</sup>   |

- 2-Chlorobiphenyl...

| ลำดับที่ | สารเคมี  | วิธีการวิเคราะห์  |
|----------|--|---|
| 28       | <ul style="list-style-type: none"> <li>- 2-Chlorobiphenyl</li> <li>- 2,3-Dichlorobiphenyl</li> <li>- 2,2',5'-Trichlorobiphenyl</li> <li>- 2,4',5'-Trichlorobiphenyl</li> <li>- 2,2',3,5'-Tetrachlorobiphenyl</li> <li>- 2,2',5,5'-Tetrachlorobiphenyl</li> <li>- 2,3',4,4'-Tetrachlorobiphenyl</li> <li>- 2,2',3,4,5'-Pentachlorobiphenyl</li> <li>- 2,2',4,5,5'-Pentachlorobiphenyl</li> <li>- 2,3,3',4',6-Pentachlorobiphenyl</li> <li>- 2,2',3,4,4',5'-Hexachlorobiphenyl</li> <li>- 2,2',3,4,5,5'-Hexachlorobiphenyl</li> <li>- 2,2',3,5,5',6-Hexachlorobiphenyl</li> <li>- 2,2',4,4',5,5'-Hexachlorobiphenyl</li> <li>- 2,2',3,3',4,4',5'-Heptachlorobiphenyl</li> <li>- 2,2',3,4,4',5,5'-Heptachlorobiphenyl</li> <li>- 2,2',3,4',5,5',6-Heptachlorobiphenyl</li> <li>- 2,2',3,4',5,5',6-Heptachlorobiphenyl</li> <li>- 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl</li> <li>- Pentachlorophenol</li> </ul> | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9,26)</sup><br>2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,26)</sup><br>Electrometric Method <sup>(27,28)</sup><br>4) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>5) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6,17)</sup><br>6) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>7) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup> |
| 29       | pH   |   |
| 30       | Selenium   |   |

31 Silver...

| ลำดับที่ | สารเคมี   | วิธีการวิเคราะห์   |
|----------|-----------|--|
| 31       | Silver    | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6,16)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6,17)</sup><br>3) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup> |
| 32       | Thallium  | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6,16)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6,17)</sup><br>3) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup> |
| 33       | Toxaphene | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(1.9,26)</sup><br>2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,26)</sup>                             |
| 34       | Vanadium  | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6,16)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6,17)</sup><br>3) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup> |
| 35       | Zinc      | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>(1.6,16)</sup><br>2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(1.6,17)</sup><br>3) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup> |

คืบ...

## คืบ จำนวน 125 รายการ

| ลำดับที่ | สารเคมี           | วิธีการวิเคราะห์   |
|----------|-------------------|--|
| 1        | Acenaphthene      | 1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,26)</sup> |
| 2        | Acetone           | 1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(1.5,23)</sup><br>2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(1.2)</sup>             |
| 3        | Aldrin            | 1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,26)</sup> |
| 4        | Anthracene        | 1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,26)</sup> |
| 5        | Antimony          | 1) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup>                                    |
| 6        | Arsenic           | 1) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup>                                    |
| 7        | Atrazine          | 1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,26)</sup> |
| 8        | Barium            | 1) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup>                                    |
| 9        | Benz(a)anthracene | 1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,26)</sup> |
| 10       | Benzene           | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(1.5,23)</sup>  |

11 Benzo(b)fluoranthene

| ลำดับที่ | สารเคมี                    | วิธีการวิเคราะห์   |
|----------|----------------------------|--|
| 11       | Benzo(b)fluoranthene       | 1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,26)</sup> |
| 12       | Benzo(k)fluoranthene       | 1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,26)</sup> |
| 13       | Benzoic acid               | 1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,26)</sup> |
| 14       | Benzo(a)pyrene             | 1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,26)</sup> |
| 15       | Benzo(g,h,i)perylene       | 1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,26)</sup> |
| 16       | Beryllium                  | 1) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup>                                    |
| 17       | Bis(2-chloroethyl)ether    | 1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,26)</sup> |
| 18       | Bis(2-ethylhexyl)phthalate | 1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,26)</sup> |
| 19       | Bromodichloromethane       | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(1.5,23)</sup>  |
| 20       | Bromoform                  | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(1.5,23)</sup>  |
| 21       | Butanol                    | Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method <sup>(1.5,23)</sup>   |
| 22       | Butyl Benzyl Phthalate     | 1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,26)</sup> |

23 Cadmium...

| ลำดับที่ | สารมลพิษ             | วิธีวิเคราะห์  |
|----------|----------------------|--|
| 23       | Cadmium              | 1) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(7,17)</sup>  |
| 24       | Carbazole            | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup>   |
| 25       | Carbon Disulfide     | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 26       | Carbon tetrachloride | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 27       | Chlordane            | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup>   |
| 28       | p-Chloroaniline      | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup>   |
| 29       | Chlorobenzene        | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 30       | Chlorodibromomethane | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 31       | Chloroform           | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 32       | 2-Chlorophenol       | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup>   |
| 33       | Chromium             | 1) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(7,17)</sup>  |
| 34       | Chromium (III)       | 1) Digestion, Inductively Coupled Plasma Method;<br>Alkaline Digestion, Colorimetric Method; Calculation<br>Method <sup>(7,8,16,19)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method; Alkaline Digestion,<br>Colorimetric Method; Calculation Method <sup>(7,8,17,19)</sup> |
| 35       | Chromium (VI)        | Alkaline Digestion, Colorimetric Method <sup>(8,19)</sup>  |

36 Chrysene...

| ลำดับที่ | สารมลพิษ              | วิธีวิเคราะห์  |
|----------|-----------------------|--|
| 36       | Chrysene              | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 37       | Cyanide               | Extraction, Distillation, Colorimetric Method <sup>(27,28,29)</sup>  |
| 38       | 2,4-D                 | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 39       | DOD                   | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 40       | DDE                   | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 41       | DDT                   | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 42       | Dibenz(a,h)anthracene | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 43       | Di-n-Butyl Phthalate  | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 44       | 1,2-Dichlorobenzene   | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 45       | 1,3-Dichlorobenzene   | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 46       | 1,4-Dichlorobenzene   | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 47       | 3,3-Dichlorobenzidine | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 48       | 1,1-Dichloroethane    | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |

49 1,2-Dichloroethane...

| ลำดับที่ | สารมลพิษ                   | วิธีวิเคราะห์  |
|----------|----------------------------|--|
| 49       | 1,2-Dichloroethane         | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 50       | 1,1-Dichloroethylene       | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 51       | cis-1,2-Dichloroethylene   | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 52       | trans-1,2-Dichloroethylene | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 53       | 2,4-Dichlorophenol         | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 54       | 1,2-Dichloropropane        | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 55       | 1,3-Dichloropropane        | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 56       | 1,3-Dichloropropene        | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 57       | Dieldrin                   | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 58       | Diethyl Phthalate          | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 59       | 2,4-Dimethylphenol         | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 60       | 2,4-Dinitrophenol          | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 61       | 2,4-Dinitrotoluene         | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 62       | 2,6-Dinitrotoluene         | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |

63 Di-n-Octyl Phthalate...

| ลำดับที่ | สารมลพิษ                 | วิธีวิเคราะห์  |
|----------|--------------------------|--|
| 63       | Di-n-Octyl Phthalate     | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 64       | Endosulfan               | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 65       | Endrin                   | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 66       | Ethylbenzene             | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 67       | Fluoranthene             | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 68       | Fluorene                 | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 69       | Heptachlor               | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 70       | Heptachlor epoxide       | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 71       | Hexachlorobenzene        | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 72       | Hexachloro-1,3-butadiene | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 73       | n-Hexane                 | 1) Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup><br>2) Equilibrium Headspace, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(13)</sup>               |

73 n-Hexane...



| ลำดับที่ | สารมลพิษ                  | วิธีวิเคราะห์  |
|----------|---------------------------|--|
| 74       | $\alpha$ -HCH             | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup>   |
| 75       | $\beta$ -HCH              | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup>   |
| 76       | $\gamma$ -HCH             | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup>   |
| 77       | Hexachlorocyclopentadiene | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup>   |
| 78       | Hexachloroethane          | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup>   |
| 79       | Indeno(1,2,3-cd)pyrene    | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup>   |
| 80       | Isophorone                | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup>   |
| 81       | Lead                      | 1) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(7,17)</sup>  |
| 82       | Manganese                 | 1) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(7,17)</sup>  |
| 83       | Mercury                   | 1) Digestion, Cold-Vapor Atomic Absorption<br>Spectrometric Method <sup>(20)</sup><br>2) Thermal Decomposition, Amalgamation, and<br>Atomic Absorption Spectrophotometry <sup>(21)</sup><br>3) Digestion, Cold-Vapor Atomic Fluorescence<br>Spectrometric Method <sup>(20)</sup> |

84 Methanol...

| ลำดับที่ | สารมลพิษ                  | วิธีวิเคราะห์  |
|----------|---------------------------|--|
| 84       | Methanol                  | 1) Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup><br>2) Equilibrium Headspace, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(13,25)</sup>            |
| 85       | Methoxychlor              | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 86       | Methyl Bromide            | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 87       | Methylene Chloride        | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 88       | 2-methylphenol            | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 89       | 2-Methylnaphthalene       | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 90       | Methyl tert-Butyl Ether   | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 91       | Naphthalene               | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 92       | Nickel                    | 1) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(7,17)</sup>  |
| 93       | Nitrobenzene              | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 94       | N-Nitrosodiphenylamine    | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 95       | N-Nitrosodi-n-propylamine | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |

96 Polychlorinated biphenyls (PCBs)

| ลำดับที่ | สารมลพิษ   | วิธีวิเคราะห์  |
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| 96       | Polychlorinated biphenyls<br>(PCBs)<br>- Aroclor 1016<br>- Aroclor 1221<br>- Aroclor 1232<br>- Aroclor 1242<br>- Aroclor 1248<br>- Aroclor 1254<br>- Aroclor 1260<br>- 2-Chlorobiphenyl<br>- 2,2',3,5'-Tetrachlorobiphenyl<br>- 2,2',5,5'-Tetrachlorobiphenyl<br>- 2,3',4,4'-Tetrachlorobiphenyl<br>- 2,2,3,4,5-Pentachlorobiphenyl<br>- 2,2',4,5,5'-Pentachlorobiphenyl<br>- 2,3,3',4',6-Pentachlorobiphenyl<br>- 2,2,3,4,4',5'-Hexachlorobiphenyl<br>- 2,2',3,4,5,5'-Hexachlorobiphenyl<br>- 2,2',3,5,5',6'-Hexachlorobiphenyl<br>- 2,2',4,4',5,5'-Hexachlorobiphenyl<br>- 2,2',3,3',4,4',5'-Heptachlorobiphenyl<br>- 2,2',3,4,4',5,5'-Heptachlorobiphenyl<br>- 2,2',3,4,4',5,6'-Heptachlorobiphenyl<br>- 2,2',3,4',5,5',6'-Heptachlorobiphenyl<br>- 2,2',3,3',4,4',5,5',6'-Nonachlorobiphenyl | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 97       | Pentachlorophenol  | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |
| 98       | Phenanthrene   | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup> |

99 Phenol...

| ลำดับที่ | สารมลพิษ                                | วิธีวิเคราะห์  |
|----------|---|--|
| 99       | Phenol                                  | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup>                     |
| 100      | Pyrene                                  | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup>                     |
| 101      | Selenium                                | 1) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(7,17)</sup>  |
| 102      | Silver                                  | 1) Digestion, Inductively Coupled Plasma Method <sup>(7,16)</sup><br>2) Digestion, Inductively Coupled Plasma/<br>Mass Spectrometric Method <sup>(7,17)</sup>  |
| 103      | Styrene                                 | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 104      | 1,1,2,2-Tetrachloroethane               | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 105      | Tetrachloroethylene                     | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 106      | Toluene                                 | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 107      | Toxaphene                               | 1) Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(10,26)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(11,26)</sup>                     |
| 108      | TPH (C <sub>9</sub> -C <sub>9</sub> )   | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 109      | TPH (C <sub>8</sub> -C <sub>10</sub> )  | 1) Automate Extraction, Gas Chromatographic Method <sup>(11,22)</sup><br>2) Solvent Extraction, Gas Chromatographic Method <sup>(12,22)</sup><br>3) Ultrasonic Extraction, Gas Chromatographic Method <sup>(22,31)</sup> |
| 110      | TPH (C <sub>10</sub> -C <sub>15</sub> ) | 1) Automate Extraction, Gas Chromatographic Method <sup>(11,22)</sup><br>2) Solvent Extraction, Gas Chromatographic Method <sup>(12,22)</sup><br>3) Ultrasonic Extraction, Gas Chromatographic Method <sup>(22,31)</sup> |
| 111      | 1,2,4-Trichlorobenzene                  | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 112      | 1,1,1-Trichloroethane                   | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 113      | 1,1,2-Trichloroethane                   | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |
| 114      | Trichloroethylene                       | Purge and Trap, Gas Chromatographic/<br>Mass Spectrometric Method <sup>(15,25)</sup>   |

115 2,4,5-Trichlorophenol...

| ลำดับที่ | สารเคมี                | วิธีวิเคราะห์  |
|----------|------------------------|--|
| 115      | 2,4,5-Trichlorophenol  | 1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,24)</sup> |
| 116      | 2,4,6-Trichlorophenol  | 1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(10,28)</sup><br>2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method <sup>(11,25)</sup> |
| 117      | 1,3,5-Trimethylbenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(15,23)</sup>   |
| 118      | Vanadium               | 1) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup>                                    |
| 119      | Vinyl Acetate          | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(15,23)</sup>   |
| 120      | Vinyl Chloride         | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(15,25)</sup>   |
| 121      | m-Xylene               | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(15,23)</sup>   |
| 122      | o-Xylene               | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(15,25)</sup>   |
| 123      | p-Xylene               | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(15,25)</sup>   |
| 124      | Xylene (Total)         | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>(15,25)</sup>   |
| 125      | Zinc                   | 1) Digestion, Inductively Coupled Plasma Method <sup>(7,14)</sup><br>2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method <sup>(7,17)</sup>                                    |

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ที่ ๒๓๐๒๐/๔๑๒๑

กรมโรงงานอุตสาหกรรม  
ถนนพหลโยธิน แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๖๐๐

๒๕ มิถุนายน ๒๕๖๗

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอนเอเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอเสนอใบสมัครขอเปลี่ยนแปลงบุคลากร และขออนุมัติขอเพิ่มห้องปฏิบัติการวิเคราะห์นอกขอบเขตพื้นที่ ๕๙ มีนาคม ๒๕๖๗

ตามที่ขอที่อ้างถึง บริษัท เอนเอเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์นอกขอบเขตพื้นที่ ๖๒๐๔ ลงวันที่ ๑๖ สิงหาคม ๒๕๖๗ ขอเพิ่มบุคลากร ๕๐ คนเพื่อพัฒนาการดูแลความปลอดภัย การปนเปื้อนของสาร ความสะอาดและอื่น ๆ นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกจำนวนที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓ ราย

- |   |                            |
|---|----------------------------|
| ๑) นางสาวกรรณิศา พุ่มคง   | ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๖๒๔ |
| ๒) นายถิษฐ์ สุทธิยะ   | ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๖๒๓ |
| ๓) นางสาวกัญญา ปิ่นบุรุษ  | ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๖๒๔ |
| ๒. ให้เพิ่มจำนวนที่ห้องปฏิบัติการวิเคราะห์นอกขอบเขตพื้นที่ ๖๒๐๔ |                            |
| ๑) นางสาวกัญญา ปิ่นบุรุษ  | ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๖๒๓ |
| ๒) นางสาวกัญญา ปิ่นบุรุษ  | ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๖๒๓ |
| ๓) นางสาวกัญญา ปิ่นบุรุษ  | ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๖๒๔ |
| ๔) นายอานันท์ งามเกษม   | ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๖๒๔ |
| ๕) นายฤกษ์เดช ปิณฑะวงศ์   | ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๖๒๖ |
| ๖) นายณัฐกร หรรษา   | ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๖๒๔ |
| ๗) นายวิรัตน์ สอนงามสวน   | ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๖๒๔ |
| ๘) นายณัฐพงศ์ โสภา  | ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๖๒๔ |
| ๙) นายศศิธรณ์ นามะระ  | ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๖๒๓ |
| ๑๐) นายณัฐพล พุ่มเย็น   | ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๖๒๓ |
| ๑๑) นายอนันต์ สุชาติพันธุ์                                      | ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๖๒๓ |
| ๑๒) นายณรรธ ภาณุพงษ์ชา  | ทะเบียนเลขที่ ๖-๒๐๔-๑-๐๖๒๓ |

อนึ่ง ให้แจ้งฉบับนี้

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมทั้งสิทธิที่อาศัยขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
ในวันที่ ๒ กันยายน ๒๕๖๔

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

  
(นายพรชัย ก้อนกรง)  
รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน  
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ  
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕  
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๑๕  
ไปรษณีย์อิเล็กทรอนิกส์ saraban@dw.mai.go.th



ที่ อก ๐๓๑๐(ด)/ ๑๒๓๖ ๘ /

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๑๔ ธันวาคม ๒๕๖๓

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เขียน กรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๒ ธันวาคม ๒๕๖๓

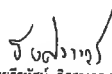
ตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ  
วิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สดามที่เดิมเลขที่ ๑๐๔ ขอขยับขยายการ ขยายพัฒนาการ ขยายพัฒนาการ  
เขตสวนหลวง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์  
จำนวน ๘ ราย ได้แก่

- |                               |                            |
|-------------------------------|----------------------------|
| ๑) นายประพนธ์ วรณชัย          | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๐๖๐ |
| ๒) นายจิรพันธุ์ ขาวชะอ        | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๐๗๒ |
| ๓) นายศิริพัฒน์ คำคำ          | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๐๘ |
| ๔) นางสาวอรุณ คำคำ            | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๓๔ |
| ๕) นายกิตติพงศ์ แซ่ลี้        | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๔๔ |
| ๖) นายจิรเมธ ประเสริฐศิริพงศ์ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๖๐ |
| ๗) นายภัทรพงษ์ มณฑาทอง        | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๖๗ |
| ๘) นางสาวจางุวรรณ กระจำพันธุ์ | ทะเบียนเลขที่ ๖-๒๐๔-จ-๐๑๘๑ |

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

  
(นายอิทธิพนธ์ อัครพงศ์) ณ อยุธยา  
รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน  
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โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕  
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๑๕  
ไปรษณีย์อิเล็กทรอนิกส์ saraban@dw.mai.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"





บริษัท เอแอลเอส แล็บอราทอรี กรุ๊ป (ประเทศไทย) จำกัด (สำนักงานใหญ่)

104 ซอยพัฒนาการ 40 ถนนพัฒนาการ

แขวงพัฒนาการ เขตสวนหลวง กรุงเทพฯ 10250

ติดต่อเรา

