綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港新界葵涌永基路22-24號好爸爸創科大廈
Good Ba Ba Hitech Building, Nos. 22-24 Wing Kei Road, Kwai Chung, New Territories, Hong Kong
Tel: (852) 2873 6860 Fax: (852) 2555 7533 E-mail: smec@cigismec.com Website: www.cigismec.com

# CERTIFICATE OF CALIBRATION

**Certificate No.:** 21CA0326 03-02 **Page** 1 **of** 2

## Item tested

| | | | |
|---|---|---|---|
| Description: | Sound Level Meter (Type 1) | , | Microphone |
| Manufacturer: | Larson Davis | , | PCB |
| Type/Model No.: | LxT1 | , | 377B02 |
| Serial/Equipment No.: | 0003737 | , | 171529 |
| Adaptors used: | - | , | - |

## Item submitted by

| | |
|---|---|
| Customer Name: | Lam Environmental Services Limited. |
| Address of Customer: | - |
| Request No.: | - |
| Date of receipt: | 26-Mar-2021 |

## Date of test: 31-Mar-2021

## Reference equipment used in the calibration

| Description: | Model: | Serial No. | Expiry Date: | Traceable to: |
|---|---|---|---|---|
| Multi function sound calibrator | B&K 4226 | 2288444 | 23-Aug-2021 | CIGISMEC |
| Signal generator | DS 360 | 33873 | 19-May-2021 | CEPREI |

## Ambient conditions

| | |
|---|---|
| Temperature: | 21 ± 1 °C |
| Relative humidity: | 55 ± 10 % |
| Air pressure: | 1005 ± 5 hPa |

## Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

## Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

**Approved Signatory:** Feng Junqi **Date:** 07-Apr-2021 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

**Comments:** The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument. The results apply to the item as received.

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# CERTIFICATE OF CALIBRATION

(Continuation Page)

**Certificate No.:** 21CA0326 03-02 **Page** 2 **of** 2

## 1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

| Test: | Subtest: | Status: | Expanded Uncertainty (dB) | Coverage Factor |
|---|---|---|---|---|
| Self-generated noise | A | Pass | 0.3 | |
| | C | Pass | 0.8 | 2.1 |
| | Lin | Pass | 1.6 | 2.2 |
| Linearity range for Leq | At reference range , Step 5 dB at 4 kHz | Pass | 0.3 | |
| | Reference SPL on all other ranges | Pass | 0.3 | |
| | 2 dB below upper limit of each range | Pass | 0.3 | |
| | 2 dB above lower limit of each range | Pass | 0.3 | |
| Linearity range for SPL | At reference range , Step 5 dB at 4 kHz | Pass | 0.3 | |
| Frequency weightings | A | Pass | 0.3 | |
| | C | Pass | 0.3 | |
| | Lin | Pass | 0.3 | |
| Time weightings | Single Burst Fast | Pass | 0.3 | |
| | Single Burst Slow | Pass | 0.3 | |
| Peak response | Single 100μs rectangular pulse | Pass | 0.3 | |
| R.M.S. accuracy | Crest factor of 3 | Pass | 0.3 | |
| Time weighting I | Single burst 5 ms at 2000 Hz | Pass | 0.3 | |
| | Repeated at frequency of 100 Hz | Pass | 0.3 | |
| Time averaging | 1 ms burst duty factor $1/10^3$ at 4kHz | Pass | 0.3 | |
| | 1 ms burst duty factor $1/10^4$ at 4kHz | Pass | 0.3 | |
| Pulse range | Single burst 10 ms at 4 kHz | Pass | 0.4 | |
| Sound exposure level | Single burst 10 ms at 4 kHz | Pass | 0.4 | |
| Overload indication | SPL | Pass | 0.3 | |
| | Leq | Pass | 0.4 | |

## 2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

| Test: | Subtest | Status | Expanded Uncertainty (dB) | Coverage Factor |
|---|---|---|---|---|
| Acoustic response | Weighting A at 125 Hz | Pass | 0.3 | |
| | Weighting A at 8000 Hz | Pass | 0.5 | |

## 3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

**Calibrated by:** Fung Chi Yip **Date:** 31-Mar-2021

**Checked by:** Chan Yuk Yiu **Date:** 07-Apr-2021

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
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HOKLAS 028 CAL

# CERTIFICATE OF CALIBRATION

**Certificate No.:** 21CA0222 02-01 **Page** 1 **of** 2

## Item tested

| | | | | |
|---|---|---|---|---|
| Description: | Sound Level Meter (Type 1) | , | Microphone | Preamp |
| Manufacturer: | Nti | , | Nti Andio | Nti Andio |
| Type/Model No.: | XL2 | , | MC230A | MA220 |
| Serial/Equipment No.: | A2A-15360-EO | , | A14232 | 6830 |
| Adaptors used: | - | , | | |

## Item submitted by

| | |
|---|---|
| Customer Name: | Lam Environmental Services Limited. |
| Address of Customer: | - |
| Request No.: | - |
| Date of receipt: | 22-Feb-2021 |

**Date of test:** 23-Feb-2021

## Reference equipment used in the calibration

| Description: | Model: | Serial No. | Expiry Date: | Traceable to: |
|---|---|---|---|---|
| Multi function sound calibrator | B&K 4226 | 2288444 | 23-Aug-2021 | CIGISMEC |
| Signal generator | DS 360 | 33873 | 19-May-2021 | CEPREI |

## Ambient conditions

| | |
|---|---|
| Temperature: | 22 ± 1 °C |
| Relative humidity: | 55 ± 10 % |
| Air pressure: | 1000 ± 5 hPa |

## Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

## Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

**Approved Signatory:** Feng Junqi **Date:** 24-Feb-2021 **Company Chop:** SOILS & MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

**Comments:** The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument. The results apply to the item as received.

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# CERTIFICATE OF CALIBRATION

(Continuation Page)

**Certificate No.:** 21CA0222 02-01 **Page** 2 **of** 2

## 1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

| Test: | Subtest: | Status: | Expanded Uncertainty (dB) | Coverage Factor |
|---|---|---|---|---|
| Self-generated noise | A | Pass | 0.3 | |
| | C | Pass | 0.8 | 2.1 |
| | Lin | Pass | 1.6 | 2.2 |
| Linearity range for Leq | At reference range , Step 5 dB at 4 kHz | Pass | 0.3 | |
| | Reference SPL on all other ranges | Pass | 0.3 | |
| | 2 dB below upper limit of each range | Pass | 0.3 | |
| | 2 dB above lower limit of each range | Pass | 0.3 | |
| Linearity range for SPL | At reference range , Step 5 dB at 4 kHz | Pass | 0.3 | |
| Frequency weightings | A | Pass | 0.3 | |
| | C | Pass | 0.3 | |
| | Lin | Pass | 0.3 | |
| Time weightings | Single Burst Fast | Pass | 0.3 | |
| | Single Burst Slow | Pass | 0.3 | |
| Peak response | Single 100μs rectangular pulse | Pass | 0.3 | |
| R.M.S. accuracy | Crest factor of 3 | Pass | 0.3 | |
| Time weighting I | Single burst 5 ms at 2000 Hz | Pass | 0.3 | |
| | Repeated at frequency of 100 Hz | Pass | 0.3 | |
| Time averaging | 1 ms burst duty factor $1/10^3$ at 4kHz | Pass | 0.3 | |
| | 1 ms burst duty factor $1/10^4$ at 4kHz | Pass | 0.3 | |
| Pulse range | Single burst 10 ms at 4 kHz | Pass | 0.4 | |
| Sound exposure level | Single burst 10 ms at 4 kHz | Pass | 0.4 | |
| Overload indication | SPL | Pass | 0.3 | |
| | Leq | Pass | 0.4 | |

## 2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

| Test: | Subtest | Status | Expanded Uncertainty (dB) | Coverage Factor |
|---|---|---|---|---|
| Acoustic response | Weighting A at 125 Hz | Pass | 0.3 | |
| | Weighting A at 8000 Hz | Pass | 0.5 | |

## 3, Response to associated sound calibrator

**N/A**

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

**Calibrated by:** Tung Chi Yip **Date:** 23-Feb-2021

**Checked by:** Feng Junqi **Date:** 24-Feb-2021

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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HOKLAS 028 CAL

# CERTIFICATE OF CALIBRATION

**Certificate No.:** 20CA1119 02-01 **Page:** 1 **of** 2

## Item tested

| | |
|---|---|
| Description: | Acoustical Calibrator (Class 1) |
| Manufacturer: | Larson Davis |
| Type/Model No.: | CAL200 |
| Serial/Equipment No.: | 13437 |
| Adaptors used: | - |

## Item submitted by

| | |
|---|---|
| Curstomer: | Lam Environmental Services Limited. |
| Address of Customer: | - |
| Request No.: | - |
| Date of receipt: | 19-Nov-2020 |

## Date of test: 20-Nov-2020

## Reference equipment used in the calibration

| Description: | Model: | Serial No. | Expiry Date: | Traceable to: |
|---|---|---|---|---|
| Lab standard microphone | B&K 4180 | 2341427 | 11-May-2021 | SCL |
| Preamplifier | B&K 2673 | 2743150 | 03-Jun-2021 | CEPREI |
| Measuring amplifier | B&K 2610 | 2346941 | 03-Jun-2021 | CEPREI |
| Signal generator | DS 360 | 33873 | 19-May-2021 | CEPREI |
| Digital multi-meter | 34401A | US36087050 | 19-May-2021 | CEPREI |
| Audio analyzer | 8903B | GB41300350 | 18-May-2021 | CEPREI |
| Universal counter | 53132A | MY40003662 | 18-May-2021 | CEPREI |

## Ambient conditions

| | |
|---|---|
| Temperature: | 22 ± 1 °C |
| Relative humidity: | 55 ± 10 % |
| Air pressure: | 1005 ± 5 hPa |

## Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

## Test results

Details of the performed measurements are presented on **page 2** of this certificate.

SOILS & MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

**Approved Signatory:** Feng Junqi **Date:** 21-Nov-2020 **Company Chop:**

**Comments:** The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument. The results apply to the item as received.

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HOKLAS 028 CAL

# CERTIFICATE OF CALIBRATION

(Continuation Page)

**Certificate No.:** 20CA1119 02-01 **Page:** 2 **of** 2

## 1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

(Output level in dB re 20 μPa)

| Frequency Shown Hz | Output Sound Pressure Level Setting dB | Measured Output Sound Pressure Level dB | Estimated Expanded Uncertainty dB |
|---|---|---|---|
| 1000 | 94.00 | 93.66 | 0.10 |

## 2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

**At 1000 Hz** **STF = 0.013 dB**

Estimated expanded uncertainty 0.005 dB

## 3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

**At 1000 Hz** **Actual Frequency = 1000.1 Hz**

Estimated expanded uncertainty 0.1 Hz Coverage factor k = 2.2

## 4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

**At 1000 Hz** **TND = 0.5%**

Estimated expanded uncertainty 0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

**Calibrated by:** Fung Chi Yip **Date:** 20-Nov-2020

**Checked by:** Feng Junqi **Date:** 21-Nov-2020

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

Lam Environmental Services Limited

# Calibration Data for High Volume Sampler (TSP Sampler)

| | | | | | |
|---|---|---|---|---|---|
| **Location** | : | AMS1 | **Calbration Date** | : | 7-Sep-21 |
| **Equipment no.** | : | HVS020 | **Calbration Due Date** | : | 7-Nov-21 |

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

| **Ambient Condition** | | | | | |
|---|---|---|---|---|---|
| **Temperature, $T_a$** | 303.1 | Kelvin | **Pressure, $P_a$** | 1010 | mmHg |

| **Orifice Transfer Standard Information** | | | | | |
|---|---|---|---|---|---|
| **Equipment No.** | **3166** | **Slope, $m_c$** | 1.88375 | **Intercept, bc** | 0.03970 |
| **Last Calibration Date** | 3-Aug-21 | $(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ | | | |
| **Next Calibration Date** | 3-Aug-22 | $= m_c \times Q_{std} + b_c$ | | | |

| **Calibration of TSP** | | | | | | |
|---|---|---|---|---|---|---|
| **Calibration Point** | **Manometer Reading H (inches of water)** | | | **$Q_{std}$** ($m^3$ / min.) | **Continuous Flow Recorder, W** | **IC** $(W(P_a/1013.3 \times 298/T_a)^{1/2}/35.31)$ |
| | (up) | (down) | (difference) | **X-axis** | (CFM) | **Y-axis** |
| **1** | 1.2 | 1.2 | 2.4 | 0.7932 | 40 | 39.6053 |
| **2** | 1.9 | 1.9 | 3.8 | 1.0035 | 46 | 45.5460 |
| **3** | 3.0 | 3.0 | 6.0 | 1.2664 | 52 | 51.4868 |
| **4** | 4.0 | 4.0 | 8.0 | 1.4656 | 57 | 56.4375 |
| **5** | 5.0 | 5.0 | 10.0 | 1.6411 | 61 | 60.3980 |

By Linear Regression of Y on X

Slope, m = 24.3271 Intercept, b = 20.6759

Correlation Coefficient* = 0.9993

Calibration Accepted = Yes/~~No~~**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks :

| | | | | | |
|---|---|---|---|---|---|
| **Calibrated by** | : | Henry Lau | **Checked by** | : | James Chu |
| **Date** | : | 7-Sep-21 | **Date** | : | 7-Sep-21 |

Lam Environmental Services Limited

# Calibration Data for High Volume Sampler (TSP Sampler)

| | | | | | |
|---|---|---|---|---|---|
| **Location** | : | AMS2 | **Calbration Date** | : | 7-Sep-21 |
| **Equipment no.** | : | HVS019 | **Calbration Due Date** | : | 7-Nov-21 |

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

| **Ambient Condition** | | | | | |
|---|---|---|---|---|---|
| **Temperature, $T_a$** | 303.1 | Kelvin | **Pressure, $P_a$** | 1010 | mmHg |

| **Orifice Transfer Standard Information** | | | | | |
|---|---|---|---|---|---|
| **Equipment No.** | **3166** | **Slope, $m_c$** | 1.88375 | **Intercept, bc** | 0.03970 |
| **Last Calibration Date** | 3-Aug-21 | $(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ | | | |
| **Next Calibration Date** | 3-Aug-22 | $= m_c \times Q_{std} + b_c$ | | | |

**Calibration of TSP**

| **Calibration Point** | **Manometer Reading H (inches of water)** (up) | (down) | (difference) | **$Q_{std}$** ($m^3$ / min.) **X-axis** | **Continuous Flow Recorder, W** (CFM) | **IC** $(W(P_a/1013.3 \times 298/T_a)^{1/2}/35.31)$ **Y-axis** |
|---|---|---|---|---|---|---|
| **1** | 1.6 | 1.6 | 3.2 | 0.9192 | 34 | 33.6645 |
| **2** | 2.5 | 2.5 | 5.0 | 1.1542 | 41 | 40.5954 |
| **3** | 3.7 | 3.7 | 7.4 | 1.4088 | 50 | 49.5066 |
| **4** | 4.6 | 4.6 | 9.2 | 1.5732 | 54 | 53.4671 |
| **5** | 5.7 | 5.7 | 11.4 | 1.7536 | 59 | 58.4177 |

By Linear Regression of Y on X

Slope, m = 30.0186 Intercept, b = 6.2510

Correlation Coefficient* = 0.9984

Calibration Accepted = Yes/~~No~~**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks :

| | | | | | |
|---|---|---|---|---|---|
| **Calibrated by** | : | Henry Lau | **Checked by** | : | James Chu |
| **Date** | : | 7-Sep-21 | **Date** | : | 7-Sep-21 |

Met One Instruments
1600 Washington Blvd
Grants Pass, OR 97526
(541) 471-7111
(541) 471-7116 (Fax)
Service@metone.com

# Calibration Certificate

**The calibration results on this report certify that this instrument complies with the product specifications at the time of calibration. Calibration was performed according to accepted industry methods using equipment, procedures, and standards that are traceable to NIST and ISO.**

**Recommended calibration interval is 12 months from the first day of use.**

**Instrument Model#** *Aerocet 831* **Instrument Serial#** *W15448*

**Date of Calibration** *10/12/2020* **Sensor #** *16438*

*J. Chester* AT1
**Calibration Technician**

AT13 OCT 14 2020
**Quality Check**

**Temperature** *22* °C **Relative Humidity** *52* %

**Test Procedure:** *Aerocet 831-6100*

| PSL Size (µm) | Test Results | Test Spec. | Lot# NIST | Expiration |
|---|---|---|---|---|
| 0.3 | Pass | ± 10% | 223077 | 04/30/2023 |
| 0.5 | Pass | ± 10% | 219480 | 11/30/2022 |
| 1.0 | Pass | ± 10% | 193291 | 1/31/2021 |
| 2.5 | Pass | ± 10% | REF | NA |
| 4.0 | Pass | ± 10% | REF | NA |
| 5.0 | Pass | ± 10% | REF | NA |
| 7.0 | Pass | ± 10% | REF | NA |
| 10.0 | Pass | ± 10% | REF | NA |
| | | | | |

| Standards | Model | SN | Cal Due |
|---|---|---|---|
| Flowmeter | DCL-M | 103751 | 2/14/2021 |
| DMM | 287 | 40900121 | 2/11/2021 |
| RH/TEMP SENSOR | 083E-1-35 | U20080 | 11/11/2020 |
| Particle Counter | GT-526S | X17421 | 11/29/2020 |
| | | | |

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# Calibration Certificate

**As Received**

**This certificate documents the as received condition of your instrument. Calibration was verified using accepted industry methods, equipment, procedures and standards that are traceable to NIST and ISO.**

**Instrument Model#** Aerocet 831 **Instrument Serial#** W15448

**Date of comparison against standard** 10-12-2020 **Sensor #** 16438

**Quality Control Technician** J. Chester AT

**Temperature** 22 °C **Relative Humidity** 51 %

**Test Procedure:** Aerocet 831-6100

| As Received | Value | Range | Condition |
|---|---|---|---|
| Zero Count | 0 | Less than 5 particles in 5 min. | PASS |
| Air Flow | .09425 | .092 to .108 CFM | PASS |

| PSL Size Micron | LOT# NIST | As Received PSL Count Comparison | Allowable PSL Count Comparison | Allowable Size Accuracy | As Received Condition |
|---|---|---|---|---|---|
| 0.3 | 223077 | 150.06 | 10% to 90% | +/- 10 % | FAIL |
| 0.5 | 219480 | 37.76 | 10% to 90% | +/- 10 % | PASS |
| 1.0 | 193291 | 27.30 | 10% to 90% | +/- 10 % | PASS |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

| Standards | Model | SN | Cal Due |
|---|---|---|---|
| Flowmeter | DCL-M | 103751 | 2/14/2021 |
| DMM | 287 | 40900121 | 2/11/2021 |
| RH/TEMP SENSOR | 083E-1-35 | U20080 | 11/11/2020 |
| Particle Counter | GT-526S | X17421 | 11/29/2020 |
| | | | |

*Calibration was performed by direct comparison to a count standard.*

Met One Instruments
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(541) 471-7116 (Fax)
Service@metone.com

# Calibration Certificate

**The calibration results on this report certify that this instrument complies with the product specifications at the time of calibration. Calibration was performed according to accepted industry methods using equipment, procedures, and standards that are traceable to NIST and ISO.**

**Recommended calibration interval is 12 months from the first day of use.**

**Instrument Model#** *Aerocet 831* **Instrument Serial#** *W15449*

**Date of Calibration** *4/29/2021* **Sensor #** *16439*

*Jason Gist* AT14 — AT5

**Calibration Technician** **Quality Check**

**Temperature** *23* °C **Relative Humidity** *35* %

**Test Procedure:** *Aerocet 831-6100*

| PSL Size (µm) | Test Results | Test Spec. | Lot# NIST | Expiration |
|---|---|---|---|---|
| 0.3 | Pass | ± 10% | 223077 | 04/30/2023 |
| 0.5 | Pass | ± 10% | 219480 | 11/30/2022 |
| 1.0 | Pass | ± 10% | 229294 | 8/31/2023 |
| 2.5 | Pass | ± 10% | REF | NA |
| 4.0 | Pass | ± 10% | REF | NA |
| 5.0 | Pass | ± 10% | REF | NA |
| 7.0 | Pass | ± 10% | REF | NA |
| 10.0 | Pass | ± 10% | REF | NA |
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| Standards | Model | SN | Cal Due |
|---|---|---|---|
| Dry Cal | Defender 530+ | 170092 | 2/9/2022 |
| DMM | 289 | 27720071 | 7/31/2021 |
| RH/TEMP SENSOR | 083E-1-6 | R20313 | 9/17/2021 |
| Particle Counter | GT-526 | M1761 | 8/26/2021 |
| | | | |

Met One Instruments
1600 Washington Blvd
Grants Pass, OR 97526
(541) 471-7111
(541) 471-7116 (Fax)
Service@metone.com

# Calibration Certificate

**As Received**

**This certificate documents the as received condition of your instrument. Calibration was verified using accepted industry methods, equipment, procedures and standards that are traceable to NIST and ISO.**

**Instrument Model#** Aerocet 831 **Instrument Serial#** W15449

**Date of comparison against standard** 4-27-2021 **Sensor #** 16439

**Quality Control Technician** Jason Gist AT14

**Temperature** 23 °C **Relative Humidity** 32 %

**Test Procedure:** Aerocet 831-6100

| As Received | Value | Range | Condition |
|---|---|---|---|
| Zero Count | 0 | Less than 5 particles in 5 min. | PASS |
| Air Flow | .08916 | .092 to .108 CFM | FAIL |

| PSL Size Micron | LOT# NIST | As Received PSL Count Comparison | Allowable PSL Count Comparison | Allowable Size Accuracy | As Received Condition |
|---|---|---|---|---|---|
| 0.3 | 223077 | 48.87 | 10% to 90% | +/- 10 % | PASS |
| 0.5 | 219480 | 48.71 | 10% to 90% | +/- 10 % | PASS |
| 1.0 | 229294 | 48.09 | 10% to 90% | +/- 10 % | PASS |
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| Standards | Model | SN | Cal Due |
|---|---|---|---|
| Dry Cal | Defender 530+ | 170092 | 2/9/2022 |
| DMM | 289 | 23700150 | 5/4/2021 |
| RH/TEMP SENSOR | 083E-1-6 | R20313 | 9/17/2021 |
| Particle Counter | GT-526 | M1761 | 8/26/2021 |
| | | | |

*Calibration was performed by direct comparison to a count standard.*

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# Calibration Certificate

**The calibration results on this report certify that this instrument complies with the product specifications at the time of calibration. Calibration was performed according to accepted industry methods using equipment, procedures, and standards that are traceable to NIST and ISO.**

**Recommended calibration interval is 12 months from the first day of use.**

**Instrument Model#** *Aerocet 831* **Instrument Serial#** *W16848*

**Date of Calibration** *12/3/2020* **Sensor #** *16574*

*Jason Gist* AT14
**Calibration Technician**

AT21 DEC 07 2020
**Quality Check**

**Temperature** *23* °C **Relative Humidity** *28* %

**Test Procedure:** *Aerocet 831-6100*

| PSL Size (µm) | Test Results | Test Spec. | Lot# NIST | Expiration |
|---|---|---|---|---|
| 0.3 | Pass | ± 10% | 223077 | 04/30/2023 |
| 0.5 | Pass | ± 10% | 219480 | 11/30/2022 |
| 1.0 | Pass | ± 10% | 193291 | 1/31/2021 |
| 2.5 | Pass | ± 10% | REF | NA |
| 4.0 | Pass | ± 10% | REF | NA |
| 5.0 | Pass | ± 10% | REF | NA |
| 7.0 | Pass | ± 10% | REF | NA |
| 10.0 | Pass | ± 10% | REF | NA |
| | | | | |

| Standards | Model | SN | Cal Due |
|---|---|---|---|
| Dry Cal | Defender 530+ | 170092 | 1/28/2021 |
| DMM | 289 | 23700150 | 5/4/2021 |
| RH/TEMP SENSOR | 083E-1-6 | R20313 | 9/17/2021 |
| Particle Counter | GT-526S | X17420 | 12/20/2020 |
| | | | |

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# Calibration Certificate

**As Received**

This certificate documents the as received condition of your instrument. Calibration was verified using accepted industry methods, equipment, procedures and standards that are traceable to NIST and ISO.

**Instrument Model#** Aerocet 831 **Instrument Serial#** W16848

**Date of comparison against standard** 12-2-2020 **Sensor #** 16574

**Quality Control Technician** Jason Gist AT14

**Temperature** 23 °C **Relative Humidity** 29 %

**Test Procedure:** Aerocet 831-6100

| As Received | Value | Range | Condition |
|---|---|---|---|
| Zero Count | 0 | Less than 5 particles in 5 min. | PASS |
| Air Flow | .09915 | .092 to .108 CFM | PASS |

| PSL Size Micron | LOT# NIST | As Received PSL Count Comparison | Allowable PSL Count Comparison | Allowable Size Accuracy | As Received Condition |
|---|---|---|---|---|---|
| 0.3 | 223077 | 47.13 | 10% to 90% | +/- 10 % | PASS |
| 0.5 | 219480 | 51.49 | 10% to 90% | +/- 10 % | PASS |
| 1.0 | 193291 | 40.68 | 10% to 90% | +/- 10 % | PASS |
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| Standards | Model | SN | Cal Due |
|---|---|---|---|
| Dry Cal | Defender 530+ | 170092 | 1/28/2021 |
| DMM | 289 | 23700150 | 5/4/2021 |
| RH/TEMP SENSOR | 083E-1-6 | R20313 | 9/17/2021 |
| Particle Counter | GT-526S | X17420 | 12/20/2020 |
| | | | |

*Calibration was performed by direct comparison to a count standard.*

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# Calibration Certificate

**The calibration results on this report certify that this instrument complies with the product specifications at the time of calibration. Calibration was performed according to accepted industry methods using equipment, procedures, and standards that are traceable to NIST and ISO.**

**Recommended calibration interval is 12 months from the first day of use.**

**Instrument Model#** *Aerocet 831* **Instrument Serial#** *Y23153*

**Date of Calibration** *12/3/2020* **Sensor #** *19493*

*Jason Gist* AT14 AT21 DEC 07 2020

**Calibration Technician** **Quality Check**

**Temperature** *23* °C **Relative Humidity** *28* %

**Test Procedure:** *Aerocet 831-6100*

| PSL Size (µm) | Test Results | Test Spec. | Lot# NIST | Expiration |
|---|---|---|---|---|
| 0.3 | Pass | ± 10% | 223077 | 04/30/2023 |
| 0.5 | Pass | ± 10% | 219480 | 11/30/2022 |
| 1.0 | Pass | ± 10% | 193291 | 1/31/2021 |
| 2.5 | Pass | ± 10% | REF | NA |
| 4.0 | Pass | ± 10% | REF | NA |
| 5.0 | Pass | ± 10% | REF | NA |
| 7.0 | Pass | ± 10% | REF | NA |
| 10.0 | Pass | ± 10% | REF | NA |
| | | | | |

| Standards | Model | SN | Cal Due |
|---|---|---|---|
| Dry Cal | Defender 530+ | 170092 | 1/28/2021 |
| DMM | 289 | 23700150 | 5/4/2021 |
| RH/TEMP SENSOR | 083E-1-6 | R20313 | 9/17/2021 |
| Particle Counter | GT-526S | X17420 | 12/20/2020 |
| | | | |

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# Calibration Certificate

**As Received**

**This certificate documents the as received condition of your instrument. Calibration was verified using accepted industry methods, equipment, procedures and standards that are traceable to NIST and ISO.**

**Instrument Model#** Aerocet 831 **Instrument Serial#** Y23153

**Date of comparison against standard** 12-2-2020 **Sensor #** 19493

**Quality Control Technician** Jason Gist

**Temperature** 23 °C **Relative Humidity** 29 %

**Test Procedure:** Aerocet 831-6100

| As Received | Value | Range | Condition |
|---|---|---|---|
| Zero Count | 0 | Less than 5 particles in 5 min. | PASS |
| Air Flow | .09044 | .092 to .108 CFM | FAIL |

| PSL Size Micron | LOT# NIST | As Received PSL Count Comparison | Allowable PSL Count Comparison | Allowable Size Accuracy | As Received Condition |
|---|---|---|---|---|---|
| 0.3 | 223077 | 57.69 | 10% to 90% | +/- 10 % | PASS |
| 0.5 | 219480 | 30.82 | 10% to 90% | +/- 10 % | PASS |
| 1.0 | 193291 | 19.68 | 10% to 90% | +/- 10 % | PASS |
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| Standards | Model | SN | Cal Due |
|---|---|---|---|
| Dry Cal | Defender 530+ | 170092 | 1/28/2021 |
| DMM | 289 | 23700150 | 5/4/2021 |
| RH/TEMP SENSOR | 083E-1-6 | R20313 | 9/17/2021 |
| Particle Counter | GT-526S | X17420 | 12/20/2020 |
| | | | |

*Calibration was performed by direct comparison to a count standard.*