

JBW

CERTIFICATE OF VALIDATION

AS FOUND DATA

NIST*-Traceable Certification for SAS Air Sampler

*National Institute of Standards and Technology

Model: SUPER " 180 "

Date: 12-6-18

Serial No.: 00-C-1453 w/ss head 15901

Val. Technician: [Signature]

Company: Aerobiology Laboratory Associates

Checked by: [Signature]

Temperature, °F: 70

Barometric Pressure, in. Hg: 30.1

Temp. and Pressure Correction Factor: 1.0004

Anemometer Reading, meters/second: .509

Corrected Air Velocity, meters/second: .511

Air Flow, liters/minute: 178.4

| Display Setting (Sample Volume) | Sampling Time (Minutes) |
|---------------------------------|-------------------------|
| 100 liters: | <u>.55</u> Minutes |
| 500 liters: | <u>2.75</u> Minutes |
| 1000 liters: | <u>5.5</u> Minutes |

Comments:

1. Accuracy = ± 5% Total
2. Validated at battery output 9.9 volts. BBL TSA Petri
3. Validated with contact plate in place. Lot 8248952 Exp. 1-4-19
4. Anemometer serial number 66050014 (see attached certificate of calibration).

JBW & Associates, Inc.
10242 Little Rock Lane
Frederick, Maryland 21702

Bioscience International
Telephone: 301-230-0072

JBW

CERTIFICATE OF CALIBRATION

FINAL DATA

NIST*-Traceable Certification for SAS Air Sampler

*National Institute of Standards and Technology

Model: SUPER " 180 "

Date: 12-6-18

Serial No. : 00-C-1453 w/ss head 15901

Next Cal. Due: 12-6-19

Company: Aerobiology Laboratory Associates

Cal. Technician: [Signature]

Checked by: [Signature]

Temperature, °F: 70

Barometric Pressure, in. Hg: 30.1

Temp. and Pressure Correction Factor: 1.004

Anemometer Reading, meters/second: .514

Corrected Air Velocity, meters/second: .516

Air Flow, liters/minute: 180.0

| Display Setting (Sample Volume) | Sampling Time (Minutes) |
|---------------------------------|-------------------------|
| 100 liters: _____ | .55 _____ Minutes |
| 500 liters: _____ | 2.75 _____ Minutes |
| 1000 liters: _____ | 5.5 _____ Minutes |

Comments:

1. Accuracy = $\pm 5\%$ Total
2. Calibrated at battery output 9.6 volts. BBL TSA Petri
3. Calibrated with contact plate in place. Lot 8248952 Exp. 1-4-19
4. Anemometer serial number 66050014 (see attached certificate of calibration).

JBW & Associates, Inc.
10242 Little Rock Lane
Frederick, Maryland 21702

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Telephone: 301-230-0072



CERTIFICATE OF CALIBRATION AND TESTING

TSI Incorporated, 500 Cardigan Road, Shoreview, MN 55126 USA
Tel: 1-800-874-2811 1-651-490-2811 Fax: 1-651-490-3824 <http://www.tsi.com>

| | | | | |
|------------------------|---------------|------------|---------------|----------|
| ENVIRONMENT CONDITIONS | | | MODEL | 8455-12 |
| TEMPERATURE | 73.9 (23.3) | °F (°C) | SERIAL NUMBER | 66050014 |
| RELATIVE HUMIDITY | 52 | %RH | | |
| BAROMETRIC PRESSURE | 29.11 (985.8) | inHg (hPa) | | |

AS LEFT
 AS FOUND

IN TOLERANCE
 OUT OF TOLERANCE

- CALIBRATION VERIFICATION RESULTS -

VELOCITY VERIFICATION SYSTEM V-110 Unit: ft/min (m/s)

WITH RANGE = 0 - 200.0 STD FT/MIN, 0 - 1.0 STD M/S

| # | STANDARD | MEASURED | ALLOWABLE RANGE | # | STANDARD | MEASURED | ALLOWABLE RANGE |
|---|-----------|-----------|-------------------|---|------------|------------|---------------------|
| 1 | 0 (0.00) | 0 (0.00) | -1-1 (-0.01-0.01) | 5 | 72 (0.36) | 71 (0.36) | 69-74 (0.35-0.38) |
| 2 | 25 (0.13) | 25 (0.13) | 23-26 (0.12-0.13) | 6 | 112 (0.57) | 112 (0.57) | 109-116 (0.55-0.59) |
| 3 | 37 (0.19) | 38 (0.19) | 36-39 (0.18-0.20) | 7 | 170 (0.86) | 169 (0.86) | 165-174 (0.84-0.88) |
| 4 | 53 (0.27) | 53 (0.27) | 51-55 (0.26-0.28) | | | | |

VELOCITY VERIFICATION SYSTEM V-110 Unit: ft/min (m/s)

WITH RANGE = 0 - 1000.0 STD FT/MIN, 0 - 5.0 STD M/S

| # | STANDARD | MEASURED | ALLOWABLE RANGE | # | STANDARD | MEASURED | ALLOWABLE RANGE |
|---|------------|------------|---------------------|---|------------|------------|---------------------|
| 1 | 252 (1.28) | 253 (1.28) | 242-262 (1.23-1.33) | 3 | 527 (2.68) | 524 (2.66) | 511-542 (2.60-2.75) |
| 2 | 379 (1.93) | 377 (1.92) | 367-392 (1.86-1.99) | 4 | 716 (3.63) | 714 (3.63) | 696-735 (3.54-3.73) |

VELOCITY VERIFICATION SYSTEM V-110 Unit: ft/min (m/s)

WITH RANGE = 0 - 10000.0 STD FT/MIN, 0 - 50.0 STD M/S

| # | STANDARD | MEASURED | ALLOWABLE RANGE | # | STANDARD | MEASURED | ALLOWABLE RANGE |
|---|--------------|--------------|-------------------------|---|--------------|--------------|-------------------------|
| 1 | 1119 (5.69) | 1127 (5.72) | 1047-1192 (5.32-6.05) | 5 | 5279 (26.82) | 5244 (26.64) | 5123-5434 (26.03-27.61) |
| 2 | 1679 (8.53) | 1677 (8.52) | 1596-1763 (8.11-8.95) | 6 | 7198 (36.57) | 7157 (36.36) | 7004-7392 (35.58-37.55) |
| 3 | 2526 (12.83) | 2541 (12.91) | 2425-2627 (12.32-13.34) | 7 | 8985 (45.64) | 8990 (45.67) | 8755-9215 (44.48-46.81) |
| 4 | 3785 (19.23) | 3766 (19.13) | 3659-3910 (18.59-19.86) | | | | |

Tolerance: ± 2.0% of reading, ± 0.5% of full scale of selected range
Std Conditions: Temperature: 21.1°C Barometric Pressure: 760.0 mmHg

TSI does hereby certify that the above described instrument conforms to the original manufacturer's specification (not applicable to As Found data) and has been calibrated using standards whose accuracies are traceable to the United States National Institute of Standards and Technology (NIST) or has been verified with respect to instrumentation whose accuracy is traceable to NIST, or is derived from accepted values of physical constants. TSI's calibration system is registered to ISO-9001:2015

| Measurement Variable | System ID | Last Cal | Cal. Due | Measurement Variable | System ID | Last Cal | Cal. Due |
|----------------------|-----------|----------|----------|----------------------|-----------|----------|----------|
| DC Voltage | E001658 | 02-01-18 | 08-31-19 | Temperature | E004402 | 05-21-18 | 11-30-18 |
| Pressure | E001719 | 04-11-18 | 10-31-18 | Pressure | E001721 | 04-11-18 | 10-31-18 |
| Velocity | E005916 | 08-14-17 | 08-31-20 | | | | |

Chao Vang

CALIBRATED

September 4, 2018

DATE



Calibration
Certificate No. 1750.01

Calibration complies with ISO 9001
ISO/IEC 17025 AND ANSI/NCCL Z540-1



Cert. No.: 1015-8251747

Traceable® Certificate of Calibration for Stopwatch

Manufactured for and distributed by: VWR International, LLC, Radnor Corporate Center, Bldg 1, Ste 200, 100 Matsonford Road, Radnor, PA 19087
Instrument Identification:

Model: 62379-058 S/N: 170039029 Manufacturer: Control Company

Standards/Equipment:

| Description | Serial Number | Due Date | NIST Traceable Reference |
|-------------------------------|---------------|----------|--------------------------|
| Non-Contact Frequency Counter | 26.86879 | 6/27/17 | 1000394057 |

Certificate Information:

Technician: 353 Procedure: CAL-01 Cal Date: 1/19/17 Due Date: 1/19/19
Test Conditions: 24.4°C 55.0 %RH 1014 mBar

Calibration Data: (New Instrument)

| Unit(s) | Nominal | As Found | In Tol | Nominal | As Left | In Tol | Min | Max | ±U | TUR |
|----------|---------|----------|--------|---------|---------|--------|--------|-------|-------|------|
| Sec/24hr | | N.A. | | 0.000 | -0.100 | Y | -0.432 | 0.432 | 0.037 | >4:1 |

This instrument was calibrated using instruments traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ±U=Expanded Measurement Uncertainty; TUR=Test Uncertainty Ratio.
Accuracy=±(Max-Min)/2; Min = Nominal(Rounded) - Tolerance; Max = Nominal(Rounded) + Tolerance; Date=MM/DD/YY

Nicol Rodriguez
Nicol Rodriguez, Quality Manager

Aaron Justice
Aaron Justice, Technical Manager

Maintaining Accuracy:

In our opinion once calibrated your Stopwatch should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Stopwatches change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 12554 Galveston RD Suite B230 Webster TX USA 77598
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

Control Company is an ISO/IEC 17025:2005 Calibration Laboratory Accredited by (A2LA) American Association for Laboratory Accreditation, Certificate No. 1750.01.
Control Company is ISO 9001:2008 Quality Certified by DNV GL, Certificate No. CERT-01805-2006-AQ-HOU-RvA.
International Laboratory Accreditation Cooperation (ILAC) - Multilateral Recognition Arrangement (MRA)