BSR/ASHRAE Addendum a
to ANSI/ASHRAE Standard 185.2-2020

First Public Review Draft

Proposed Addendum a to Standard 185.2-2020, Method of Testing Ultraviolet Lamps for Use in HVAC&R Units or Air Ducts to Inactivate Microorganisms on Irradiated Surfaces

First Public Review (April 2026)
(Draft shows Proposed Changes to Current Standard)

This draft has been recommended for public review by the responsible project committee. To submit a comment on this proposed standard, go to the ASHRAE website at https://www.ashrae.org/technical-resources/standards-and-guidelines/public-review-drafts and access the online comment database. The draft is subject to modification until it is approved for publication by the Board of Directors and ANSI. Until this time, the current edition of the standard (as modified by any published addenda on the ASHRAE website) remains in effect. The current edition of any standard may be purchased from the ASHRAE Online Store at www.ashrae.org/bookstore or by calling 404-636-8400 or 1-800-727-4723 (for orders in the U.S. or Canada).

This standard is under continuous maintenance. To propose a change to the current standard, use the change submittal form available on the ASHRAE website, www.ashrae.org.

The appearance of any technical data or editorial material in this public review document does not constitute endorsement, warranty, or guaranty by ASHRAE of any product, service, process, procedure, or design, and ASHRAE expressly disclaims such.

ASHRAE, 180 Technology Parkway NW, Peachtree Corners, GA 30092

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

This proposed addendum updates the definitions section for continuity across other ASHRAE UV-C related standards and guidelines, redefines the Rig/Duct requirements to a performance-based qualification process making the standard less prescriptive to allow for larger/longer device/source testing, clarifies intensity measurement locations, updates location and layout diagrams, and makes minor editorial changes to the published standard ANSI/ASHRAE Standard 185.2-2020. This addendum also better defines the minimum requirements for reporting the test results and includes a sample data collection sheet in Informative Appendix D.

Note: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.

Addendum a to Standard 185.2-2020

Modify Section 3 as follows. The remainder of Section 3 remains unchanged.

3. DEFINITIONS

[…]

radiometer (UV-C radiometer): device designed and calibrated for the accurate measurement of irradiance and/or dose for any germicidal UV-C source technology. Different UV-C sources may require different sensors or calibration.

radiometer sensor grid: a ~~nine point cross~~ sectional grid with predetermined locations in which to mount the radiometer sensor head.

[…]

UV-C source: a source that emits ultraviolet energy in the spectral range of 100 nm to 400 nm which may also emit energy in ranges outside the ultraviolet spectrum.

[…]

Modify Section 4 as follows. The remainder of Section 4 remains unchanged.

4. TEST APPARATUS AND PROCEDURES

4.1 Mandatory and Discretionary Requirements. Critical dimensions and arrangements of the testing rig/duct are provided in Sections 4.2 and 4.3.~~test apparatus are shown in the figures of this section.~~ All dimensions shown are mandatory unless otherwise indicated, and either SI or I-P dimensions are acceptable for any element of the system. Units shown are in mm (in.) unless otherwise indicated. The design of equipment not specified, including, but not limited to, test rig/duct, blowers, valves, and external piping, is discretionary, but the equipment must have adequate capacity to meet the requirements of this standard.

The radiometer shall use a planar radiometer sensor. The planar radiometer sensor shall be cosine corrected and fitted with correction filters to provide spectral response to the specified wavelengths of the UV-C source. The radiometer and sensor shall be calibrated against a National Institute of Standards and Technology (NIST)-traceable standard, according to manufacturer procedures.

4.2 Test Rig/Duct. The test rig/duct shall be sized to fully enclose the UV-C source while maintaining the testing

parameters; temperature, relative humidity, and airflow (provided below) across the entire surface of the source. A radiometer sensor shall be located 1.0 m (39.4 in.) from the center of the UV-C source and configured to take three measurements equidistant along maximum length of the source, for sources with a length equal to or greater than 30.5 cm (12 inches). The measurement locations are calculated using L/4, where L is the maximum distance between UV-C emitting sources or the total length of a lamp.

Three UV-C measurement locations:

1. Center of the UV-C source (C)
2. C – L/4
3. C + L/4

L = maximum length of the UV-C source

For sources with lengths less than 30.5 cm (12 in.), only one location is required. The sensor shall be located to take measurements at the center of the source (see Figure 1).

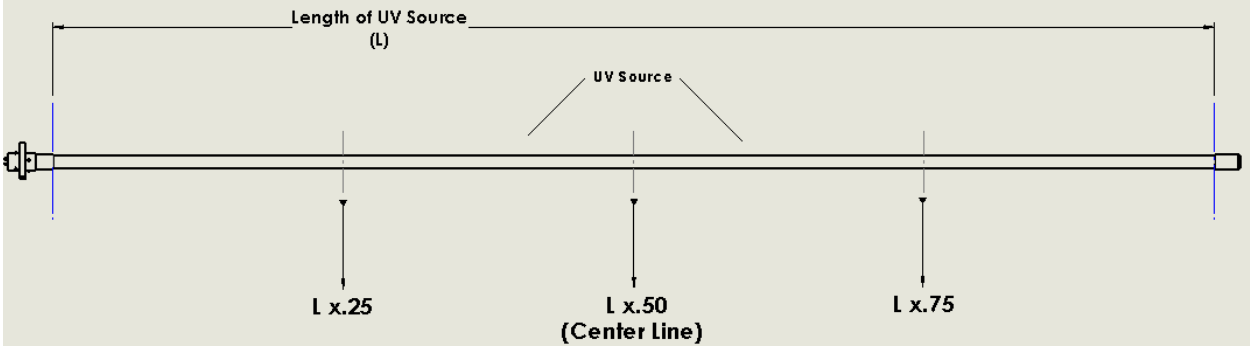


Figure 1

The test rig/duct section where the device is installed shall be completely lined with flat black felt or similar UV-C non-reflective material covering the area between the UV-C source and past the sensor and for a minimum of 15 cm (6 in.) after the section of the test rig/duct where the UV-C source is inserted.

~~**Installation of UV-C Device.** Installation of the ultraviolet C (UV-C) device, and configuration of the lamp assembly within the device, shall be as designated by the manufacturer or equipment provider. The burn-in time for lamps shall be 100 hours [†] and shall be performed by the test lab.~~

4.2.1 A means of viewing the UV-C source up or downstream of the non-reflective section containing the UV-C source to verify operation shall be included with the test rig/duct and consist of UV-C absorbing materials to prevent exposure to UV-C radiation during viewing.

4.2.2 The test rig/duct shall be capable of ramping between and maintaining three test temperatures of 12.78°C (55°F), 23.89°C (75°F), and 48.89°C (120°F) ± 3°C (5°F). The temperature shall be measured and recorded centrally, downstream of the testing location, within 1.0 m (39.4 in.) of the UV-C source.

Relative humidity shall be maintained at 50±10%. The relative humidity shall be measured and monitored, centrally, downstream of the testing location, within 1.0 m (39.4 in.) of the UV-C source.

The average air velocity shall be maintained at 2.5 ± 0.05 m/s (500 ± 10 fpm) at three points equidistant within the cross-section of the test rig/duct. Airflow shall be measured downstream of the testing area within 30.5 cm (12 in.) of the UV-C source. The system airflow shall be measured with an American Society of Mechanical Engineers (ASME) flow orifice or equivalent. At a minimum, three airflow sensors shall be located evenly within the test rig/duct (see Figure 1) such that an average air velocity can be established and recorded. To account for potential turbulence, a 30 to 60 second average of the sensors can be used to determine airflow.

4.2.3 The test duct shall be isolated from vibration caused by the blower or other sources of vibration.

~~**4.3 Test Duct.** The test apparatus shown in Figure 1 is designed for test devices with nominal face dimensions of 610 × 610 mm (24 in. × 24 in.) and a length of 1 m (39.4 in.) before and 1 m (39.4 in.) after the test section. A~~

~~radiometer sensor grid (Figure 2) shall be located 1 m (39.4 in.) on the upstream and downstream end of the duct section. This test duct section shall be completed lined with flat black felt material to limit reflectivity.~~

~~**4.3.1** A means of viewing the lamps to verify operation shall be included and consist of UV-absorbing materials to ensure that exposure to radiation does not occur during viewing.~~

~~**4.3.2** The test duct shall be capable of providing three test temperatures of 12.78°C, 23.89°C, and 48.89°C ± 2.2°C (55°F, 75°F, and 120°F ± 4°F). Relative humidity shall be 50% ± 5%, and air velocity shall be 2.54 ± 0.05 m/s (500 ± 10 fpm).~~

~~**4.3.3** The test duct shall be isolated from vibration caused by the blower or other sources of vibration.~~

~~**4.3.4** System airflow is measured with an American Society of Mechanical Engineers (ASME) flow orifice [2] or equivalent.~~

4.3 The burn-in time for the UV-C source shall adhere to the source manufacturer's specified time and be performed by the test lab. If a "burn in time" is not specified, the UV-C source shall be burned in for a minimum of 100 hours before the testing takes place. Burn-in can be performed externally to the test rig/duct.

The UV-C device shall be installed according to the manufacturer's instructions. The UV-C source shall be installed so that it is centered in the test rig/duct, such that no UV-C emitting surface shall be closer than 1 m (39.4 in.) to the UV radiometer sensor, and perpendicular to the operating airflow. Subsequent testing can be performed with the source parallel to the airflow, if desired, and such that no UV-C emitting surface shall be closer than 1 m (39.4 in.) to the UV-C sensor. The radiometer sensor shall be located perpendicular to the UV-C source and parallel to the airflow for all such tests.

4.4 UV Irradiance Measurement

~~**4.4.1 Radiometer.** The planar radiometer sensor shall be cosine corrected and fitted with correction filters to provide spectral response only to UV-C wavelengths between 220 and 280 nm, with a peak response at 254 nm. The radiometer and sensor shall be calibrated annually against a NIST-traceable 254-nm source, according to manufacturer procedures.~~

4.4.1~~**4.4.2**~~ **UV-C Irradiance Measurement.** The ~~general~~ test method calls for measurement of UV irradiance at three different air temperatures at each of ~~nine grid~~ the sensor points described in Section 4.2 above. ~~The general method describes measurements upstream and downstream of the test UV-C device.~~ A minimum of three, 1-minute average irradiance measurements must be collected for each sensor location and temperature. The radiometer shall measure and log discrete data points at a minimum of one per second.

~~**4.4.1.1** Install UV-C device in test duct. The lamp shall be installed in the center of the duct, perpendicular to the flow of air. No part of the lamp shall be closer than 1 m (39.4 in.) away from the radiometer sensor grid.~~

4.4.1.1 Mount the radiometer sensor on the first sensor location ~~grid point (at Row A, Column 1)~~. The UV-C irradiance sensor shall be mounted within the duct such that the sensor is perpendicular to the airflow.

4.4.1.2 Close all access~~es~~ doors/panels to test rig/duct~~apparatus~~.

4.4.1.3 Start airflow through the duct and set the appropriate test conditions for the measurements. Air velocity shall be 2.54 ± 0.05 m/s (500 ± 10 fpm), and relative humidity shall be 50% ± 10%, for every test. Measurements are to be conducted at each of the three air temperatures: 12.8°C (55°F), 23.9°C (75°F), and 48.9°C (120°F).

4.4.1.4 Turn on UV-C source~~device~~. Allow airflow and source~~device~~ to run ~~at stable conditions for 30 minutes~~ until one minute of irradiance measurements (not less than 60 data points) have less than 4% standard deviation of the mean irradiance or for at least 30 minutes, before beginning irradiance measurements.

4.4.1.5 ~~Record one-minute average of irradiance from the sensor.~~ 1-minute average irradiance measurements must be collected for each sensor location and at each temperature. The radiometer shall measure and log discrete data points at a minimum of one per second. The logged data shall be used to derive an average intensity for each sensor location.

4.4.1.6 Move radiometer sensor to next ~~grid point~~ sensor location. Repeat steps in Sections 4.4.1.3 through 4.4.1.5 ~~4.4.2.4 through 4.4.2.7~~ until measurements have been taken at all ~~grid~~ sensor ~~points upstream and downstream~~ for a minimum of three replications.

4.4.1.7 Change air temperature. Repeat steps in Sections 4.4.1.3 through 4.4.1.5 ~~4.4.2.4 through 4.4.2.7~~ at each

of three required air temperatures: 12.8°C (55°F), 23.9°C (75°F), and 48.9°C (120°F).~~required air temperature.~~

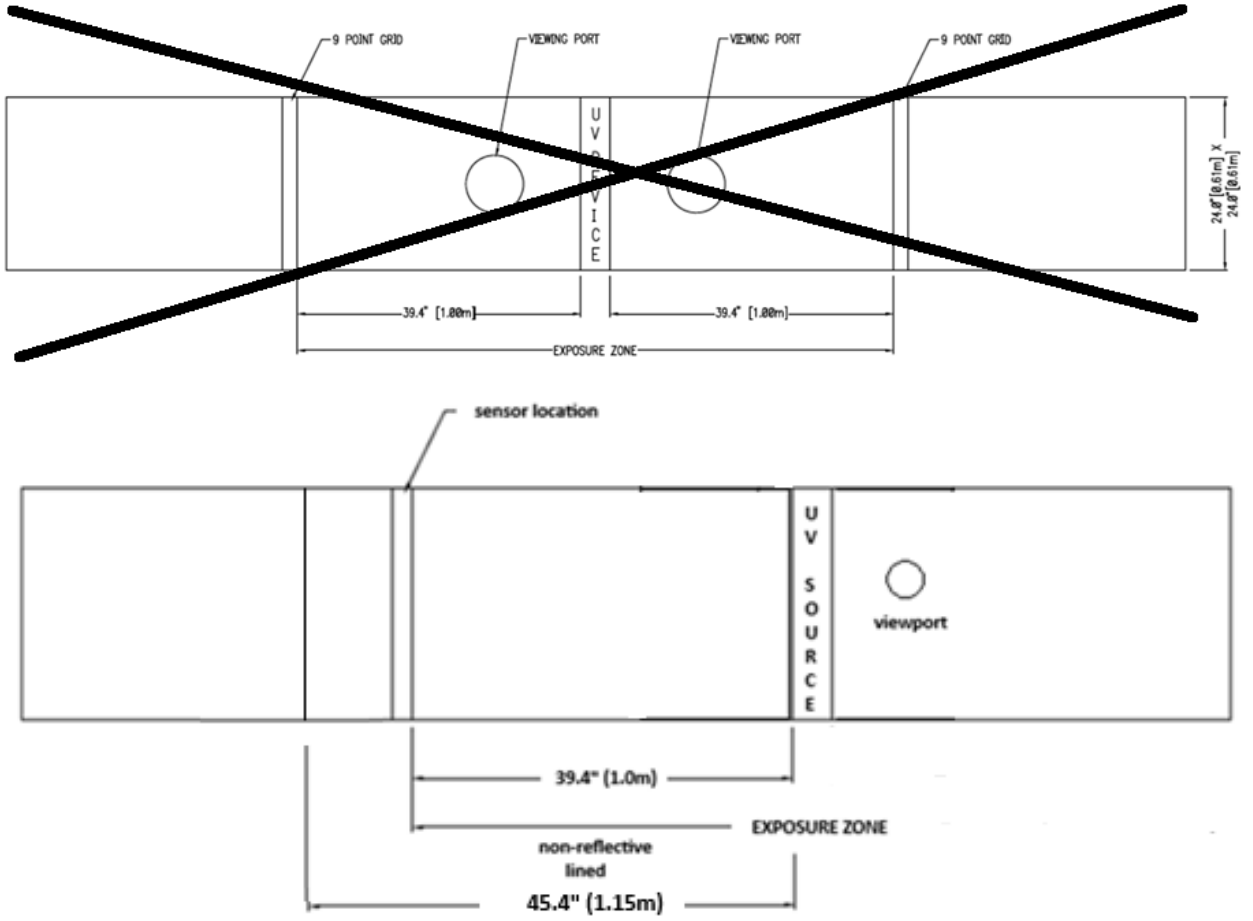
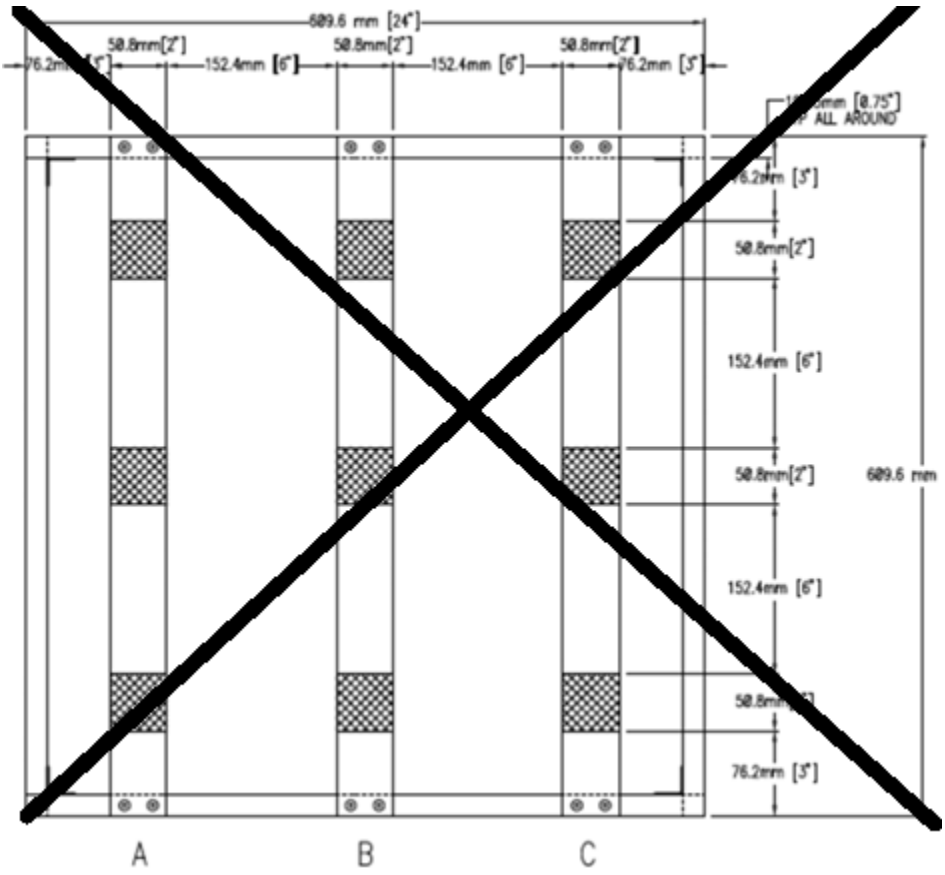


Figure ~~1~~2 Test rig/duct section (side-view detail).



~~**Figure 2 Radiometer sensor grid.**~~

Section 5 (including Table 1) is deleted in its entirety. Subsequent sections are renumbered accordingly.

5. REPORTING RESULTS

[Note to Reviewers]: *Section 6 and associated subsections are renumbered to Section 5 accordingly.*

5.1 Outline. The summary section of the performance report shall include the following information:

a. Name and location of the test laboratory
b. Date of the test
c. Test operator's name(s)
d. UV-C ~~device lamp~~ source manufacturer's name (or name of the marketing organization, if different from the manufacturer)
e. How the UV-C ~~device/lamp~~ source was obtained—i.e., from open market, manufacturer, etc.
f. Description of the test UV-C ~~device/lamp~~ source, including the following
    1. Brand, ~~and~~ model number, serial number, and any identifying marks
    2. Full description of ~~lamp~~source(s) used, including rated power (watts input), rated amperage, arc length, lamp wattage and lamp pin configuration (Any marks on the lamp [i.e., date codes or serial numbers] shall also be noted.)
    3. Full description of the ballast/driver or power supply used to power the source ~~lamp~~ for test, including manufacturer, identifying numbers/marks, rated input voltage, amperage and designed output amperage
    4. Physical description of construction, including photo and outline drawing of source~~device or lamp~~

5. Photos of source~~device~~ as positioned in the test rig and a plan view and elevation view drawing of exactly how the source~~device/lamp~~ is located in the test rig/duct and showing location of all sensors points, viewing ports, and access panels/doors.

g. Operating information as stated by the manufacturer
   1. Operating current
   2. Operating voltage

h. Test data
   1. Test air temperature and ~~relative humidity~~ range measured during the test proving that the test stayed within the method limits provided in Section 4.2.2.
   2. Relative humidity and range measured during the test, within the method limits provided in Section 4.2.2. For the test to be considered valid, the relative humidity measurements must fall within the stated tolerances herein. ~~Airflow rate~~
   3. Measured airflow rates for the traverse system airflow demonstrating consistent airflow over the entire surface of the source, as provided in Section 4.2.2. The average of the traverse measurements is used to confirm compliance with the stated testing parameters at each temperature. ~~Input volts and watts~~
   4. A data table comprised of the collected irradiance data for each location and temperature, the average irradiance for each sampling location, temperature variance for each test, and the standard deviation of the irradiance for each sensor location and temperature data set. ~~Pressure drop across the device~~

i. Complete data for all measuring instruments and sensors used for determining temperature, relative humidity, air velocity, and airflow, including calibration dates for all measurement instruments used in the test

j. The UV-C radiometer and sensor(s) (instrumentation)
   1. Specific radiometer information (brand, accuracy range, and the wavelength range)
   2. Specific radiometer sensor information (brand, accuracy range, and the wavelength range)

~~k. Irradiance levels measured per the nine points on each of the radiometer sensor grid locations indicating the specific columns and rows and for each of the three specified temperature conditions, as well as an average of all nine points at the three test temperature conditions~~

6. NORMATIVE LIMITATIONS

This standard only applies to UV-C sources as defined herein. ~~low pressure mercury vapor lamps.~~ The results show only the UV-C intensity ~~upon~~ at selected points on a surface ~~at~~ with a specific source ~~lamp~~ location.

[…]

Modify Informative Appendix A as follows. The remainder of Informative Appendix A remains unchanged.

(This appendix is not part of the standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

INFORMATIVE APPENDIX A—LIMITATIONS

[…]

Users of the method will need to determine if their particular source ~~device~~ requires specialized testing conditions; however, the general approach described here should be applicable to most technologies. If the performance of multiple technologies is to be compared, then the test lab needs to standardize all variables of the test plan.

[…]

Add new Informative Appendix D as shown.

(This appendix is not part of the standard. It is merely informative and does not contain requirements necessary

for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

INFORMATIVE APPENDIX D—SAMPLE DATA COLLECTION

Date:

Name of Test Laboratory:

Address:

Date of Test:

UV-C Source:

Manufacturer/Manufacturing Organization:
Method of Acquisition (Open Market/Manufacturer):
Brand:
Model Number:
Serial Number:
Identifying Marks:
Product Certifications:
Mechanical and Electrical Drawings:
Operating Current as Noted on Labeling:
Operating Voltage as Noted on Labeling:
Photos:

Components:
Lamp/Bulb/LED Description:
Brand:
Model Number:
Wattage (Input):
Amperage:
Wattage (lamp/source):
Arc Length:
Pin Configuration:
Date Codes:
Serial Numbers:
Photos:

Electronics/Driver Description:

Brand:

Model Number:

Wattage (Input):

Amperage:

Date Codes:

Serial Numbers:

Photos:

Radiometer Description:

Brand:

Model Number Base Unit:

Serial Number Base Unit:

Model Number Sensor:

Serial Number Sensor:

Spectral Response:

Accuracy:

Calibration Date:

Photos:

Test Rig Data:

Complete UV Source Mounting Information:

Photos of Unit Mounted in Test Rig:

Drawings (Plan/Elevation) of Mounting:

Air Temperatures (with any variation noted):

*To be a valid test, any variation must be within stated tolerances of ±2°C (±4°F)

Relative Humidity (with any variation noted):

*To be a valid test, any variation must be within stated tolerances of ±10% RH

Air Velocity Rate Average for the Traverse System Flow

Minimum 3 locations (R – C – L)

Calculated using W/4 where W is the total duct width

Irradiance Measurements

Temperature 1 – 12.78°C (55°F)	Trial 1	Trial 2	Trial 3	Average
L1				
L2				
L3				

Standard deviation:

Temperature 2 – 23.89°C (75°F)	Trial 1	Trial 2	Trial 3	Average
L1				
L2				
L3				

Standard deviation:

Temperature 3 – 48.89°C (120°F)	Trial 1	Trial 2	Trial 3	Average
L1				
L2				
L3				

Standard deviation: