

## **SPECIFICATION FOR ULTRAVIOLET IRRADIATION FOR IN-DUCT AIR DISINFECTION**

### **PART 1 GENERAL**

- 1.1. In-duct ultraviolet air disinfection equipment serves the purpose of disinfecting an air stream in a building or room ventilation system. Such equipment is designed to treat the airflow as it flows within the duct. In-duct ultraviolet equipment must be engineered to achieve a required level of air disinfection and are often customized for each installation. However, some standards have been developed for preventive building UVC disinfection based on common universal bio-contaminants such as the Influenza virus, Legionella, and Tuberculosis bacillus.
- 1.2. The specified equipment sizing shall be adequately engineered for each duct size and air flow using a moving air irradiation calculation software.
- 1.3. The supplier proposal shall include for each air duct the following mandatory technical data:
  - 1.3.1. Duct Height and Width
  - 1.3.2. Available straight duct Length where the air stream could be exposed to UV
  - 1.3.3. Air flow rate
  - 1.3.4. Air Temperature and relative humidity
  - 1.3.5. UVC Reflectivity of the inner duct lining material
  - 1.3.6. A list of bio-contaminants of concern with their respective UVC susceptibility values
  - 1.3.7. Number of UV lamps and their position within the duct
  - 1.3.8. The total power consumption of the UVC equipment.
  - 1.3.9. The temperature increase of the air stream due to UVC equipment.
  - 1.3.10. The expected pressure drop due to the UVC equipment.
  - 1.3.11. A complete duct cross sectional UVC dose-chart showing the distribution of the delivered UV energy.
  - 1.3.12. The disinfection performance after 1 pass of the bio-contaminants of concern
  - 1.3.13. The disinfection performance after 2,4 and 8 recirculation passes for each bio-contaminants of concern
- 1.4. All of the calculations provided must be based on UV lamp end of life i.e. 17,000 hrs depreciated output. The supplier shall declare the % output depreciation of their lamps after 17,000 hours.
- 1.5. To prevent premature disinfection performance degradation due to lamp fouling and excessive convective cooling of the lamps, the UVC lamps shall be installed parallel to the air flow inside the duct.

### **PART 2- PRODUCT**

- 2.1 SANUVOX BIO-WALL MAX air sterilizer or equivalent.
- 2.2 To provide an individual Cylindrical Array that will effectively create a barrier wall of germicidal UV energy that will disinfect 100% of the air that passes by.
- 2.3 The Cylindrical Array will consist of five outwardly projecting UV lamps encapsulated into a protective wide angle parabolic aluminum reflector mounted parallel to the air flow.
- 2.4 The lamp encapsulating aluminum parabolic wide angle reflector will be built from extruded anodized aluminum for optimum UVC reflectivity. Having a poor UVC reflectivity coefficient, stainless steel shall not be used as a reflector since according to ASHRAE 2008 Chapter 16 entitled Ultraviolet Lamp Systems, p.16.6 Table 2 indicates that the reflectivity of stainless steel is between only 20 and 30% whereas aluminum ranges from 73 to 88% reflectivity.
- 2.5 The aluminum reflector will be built from a single aluminum extrusion aerodynamically shaped to be capable of withstanding air velocities up to 3000 ft/min (15 m/s) without wobble, vibration or noise.
- 2.6 The overall diameter of the Cylindrical Array will not exceed 5 inches (11.4 cm).
- 2.8 The power supply ballast box shall be mounted outside the duct. Ballasts mounted inside the duct shall not be accepted.

**PART 3- ELECTRICAL**

- 3.1. Equipment to be CE, CSA/UL/or ETL certified.
- 3.2. The portion of the wire set connecting the Cylindrical Array to the ballast box shall be of 18Awg, UL1716 Teflon wire in an half inch (1/2) Liquid-tight Conduit. The maximum length of this cable between the lamps and ballast box will be 10 ft ( 3 m)
- 3.3. The aluminum ballast box shall consist of one ballast for each lamp, dry contact(s) to connect to the BMS and a power relay to be able to remotely turn the five (5) lamps on and off.

**PART 4- INSTALLATION**

- 4.1 The Cylindrical Array can be positioned in either the return duct or the supply duct of the AHU.
- 4.2 In order to guarantee the adequate disinfection performance for a given AHU, the vendor shall specify in detail, a manufacturer approved layout of the number of Cylindrical Array's required and their respective position.
- 4.3 The inside of the duct where the Cylindrical Array will be installed must be lined with aluminum to reflect the UVC radiation field generated by the Cylindrical Array back into the duct. The aluminum lining must have a minimum UVC coefficient of reflection of 80%.
- 4.4 Safety interlock switches are to be installed on all access doors where UV intensity may be present. Manufacturer is to provide CAUTION LABELS to be installed on these access doors.

**5. PART 5- UV LAMP**

- 5.1 The UVC lamp shall be proven T6 tube size specifically suited for air and surfaces sterilization. T5 lamps derived from drinking water sterilization applications will not be accepted.
- 5.2 The UVC lamps shall be of T-6 diameter (19 mm diameter) with a Single Ended, Circuline 4-pin type connection.
- 5.3 The UVC lamps shall be available in lengths of 18, 24, 30, 40, 50 and 60 inches.

**PART 6- MONITORING**

- 6.1. Every ballast box will have electronics controls for monitoring of the lamps either
  - Through a BMS system- dry contacts that could signal defective lamp (individually or globally) and power relay to start or shut down the unit at distance.
  - Or, should there be no BMS, the manufacturer will offer an OPTIONNAL remote touch screen that will display, up to 100ft away, real time lamp status individually or globally and individual hour countdown for each lamp.

**PART 7- WARRANTY**

- 7.1. The power source will carry a 15-year ballast warranty.
- 7.2. The high intensity UVC lamp will be guaranteed for 17,000 hours or 2 years, first occurrence.
- 7.3 The electronic control system will carry a 1-year warranty

**PART 8 -APPROVED MANUFACTURERS:**

8. Sanuvox Technologies Inc. – Canada or Equivalent