**ASPIRE-L by Keystone – Laminar Flow Diffuser with Integrated Lighting**

***Division 23 – Heating, Ventilating, and Air Conditioning***

***Section 23 37 13 – Diffusers, Registers, and Grilles***

The following specification is for a defined application. Keystone Clean Air Solutions would be pleased to assist in developing a specification for your specific need.

**PART 1 – GENERAL**

**1.01 Section includes**:

1. Laminar Flow Diffuser with Integrated Lighting

**1.02 Related Requirements**

1. Section 01 30 00 – Administrative Requirements
2. Section 01 40 00 – Quality Requirements
3. Section 01 60 00 – Product Requirements
4. Section 01 74 21 – Construction/Demolition Waste Management and Disposal
5. Section 01 78 00 – Closeout Submittals
6. Section 01 79 00 – Demonstration and Training
7. Section 23 31 00 – HVAC Ducts and Casings
8. Section 23 32 00 – Air Plenums and Chases

**1.03 Reference Standards**

1. ASHRAE Standard 55 – Thermal Environmental Conditions for Human Occupancy; 2013
2. ASHRAE Standard 70 – Method of Testing the Performance of Air Outlets and Air Inlets; 2006
3. ASHRAE Standard 62.1 – Ventilation for Acceptable Indoor Air Quality; 2016
4. ASHRAE Standard 170 – Ventilation of Health Care Facilities; 2013
5. ASTM Standard E84 – Standard Test Method for Surface Burning Characteristics of Building Materials; 2016
6. ASTM D1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes; 2013
7. ASTM D4752 – Standard Practice for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub; 2015
8. FGI Guideline 2010 – Facility Guidelines Institute, Guidelines for Design and Construction of Health Care Facilities; 2010
9. CSA Standard Z317.2-10 – Special Requirements for Heating, Ventilation, and Air-conditioning (HVAC) Systems in Health Care Facilities; 2010
10. NFPA Standard 90A – Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015
11. SMACNA (SRM) – Seismic Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors’ National Association; 2008
12. UL 2043 – Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces
13. UL2108 – Low Voltage Lighting System
14. UL8750 – Light Emitting Diode (LED) Equipment for Use in Lighting Products
15. UL1310 – Class 2 Power Units
16. UL94 – Flammability of Plastic Materials for Parts in Devices and Appliances
17. IP67 – Ingress Protection Against Dust and Liquids

**1.04 Administrative Requirements**

A. Pre-installation Meeting: Conduct a pre-installation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

B. Sequencing: Ensure that utility connections are achieved in an orderly and efficient manner.

**1.05 Submittals**

A. See Section 01 30 00 – Administrative Requirements for submittal procedures.

B. Product Data: Provide data indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings that indicate air flow, static pressure, and NC designation.

C. Shop Drawings: Indicate configuration, general assembly, and materials used in fabrication.

D. Certificates: Certify that air capacities, pressure drops, and selection procedures meet or exceed specified requirements.

E. Manufacturer's Installation Instructions: Indicate support and hanging details, installation instructions, recommendations, and service clearances required.

F. Project Record Documents: Record actual locations of units and control components.

G. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts lists.

H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements for additional provisions.

2. Extra Filters: Furnish one spare filter as required per component originally supplied with filters.

**1.06 Quality Assurance**

1. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum ten years of documented experience.
2. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

**1.07 Warranty**

1. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
2. Keystone Clean Air Solutions warrants that, at the time of shipment, the ULFD will be free from defects arising from manufacturing, workmanship, or a failure to adhere to Keystone Clean Air Solutions’ published catalog specifications and specified material. If Keystone Clean Air Solutions is notified in writing of any such defect within the following specified warranty periods, Keystone Clean Air Solutions will, at its sole option, repair, replace, or refund the purchase price paid by the Representative for the Product:

- LED: (7) years from the date of shipment

- Driver: (5) years from the date of shipment

- All other components and hardware: (1) year from the date of shipment

Such remedies are the exclusive remedies available under this warranty.

**PART 2 – PRODUCTS**

**2.01** **Laminar Flow Diffuser**

1. Basis of Design: Keystone Clean Air Solutions, Inc.
2. Laminar flow diffusers: Model ASPIRE-L
3. General:
4. The laminar flow diffuser shall be non-aspirating, unidirectional type, providing a uniform vertical projection of air at controlled low velocities and minimal entrainment of room air, satisfying the requirements of ASHRAE Standard 170 and FGI 2010.
5. Unit shall include integrated LED lighting and be certified to meet UL1598/CSA 22.2 No. 250.0 standard for air-handling luminaires.
6. All components of the integrated ceiling diffuser shall be from a single manufacturer.
7. Laminar Flow Diffusers [Keystone Model ASPIRE-L]:
   1. Construction
8. Air shall be admitted to the top plenum chamber through an inlet collar.
9. The diffuser module inlet collars shall be sized based on airflow requirements for the intended space.
10. The diffuser module shall be provided with 14-gauge aluminum construction and fully welded vertical seams.
11. The diffuser plenum shall include four (4) eye bolts for hanger wire support.
12. The laminar diffuser face shall be composed of 1/8” thick fire-resistant engineered polymer with 13% free area, providing non‑aspirating, unidirectional airflow above the sterile zone.
13. The laminar diffuser face frame shall be made of extruded aluminum frame with welded miter corners and secured with four (4) quarter-turn fasteners with anti-slip, snap-in retainers and stainless-steel retainer cables for ease of installation and removal.
14. An adjustable aperture plate damper with locking mechanism shall be provided to allow roomside adjustment of airflow.
15. Laminar modules will come [with or without] HEPA filters with gel seal, providing non-aspirating, unidirectional airflow above the sterile zone.
    1. Integrated Lighting:
16. Each laminar diffuser module shall include integrated LED lighting, mounted so as to not interfere with the airflow of the system. LED strip lights and fluorescent tubes directly in the airflow path are not acceptable.
17. The entire perforated face of the laminar diffuser shall be fully equalized with light. Separate LED channels separating laminar diffusers or embedded into the diffuser frames are not acceptable.
18. Each laminar diffuser module shall either have [two] or [three rows] of LEDs installed around the internal perimeter of the diffuser module.
19. LED lighting shall have an efficiency greater than 80 lumens per watt.
20. LED lighting shall be IP67 rated and not susceptible to dust and liquid cleaning agents.
21. LED lighting shall achieve Color Rendering Index (CRI) of 90 or higher.
22. LED lighting shall be rated for L80 > 60,000 hours based on LM-80 testing.
23. LED lighting shall be certified to meet UL2108 and meet fire/smoke ratings of UL2043.
24. Photometric IES files, achieved with a type-C Goniometer, shall be available to validate lighting performance.
25. LED lighting shall be paired with drivers supplied from the integrated laminar flow diffuser assembly manufacturer. Driver shall be capable of either [1%] or [10%] dimming, and PWM dimming shall meet IEEE1789. Optional 0.1% dimming available upon request.
26. LED driver shall comply with UL8750/CSA 22.2 No. 223-M91.
27. LED driver shall achieve Total Harmonic Distortion (THD) < 20% at maximum power.
    1. Paint finish:
       1. All aluminum components shall have a white B12 baked-on powder coat finish.
          1. The paint finish must demonstrate no degradation when tested in accordance with ASTM D1308 (covered and spot immersion) and ASTM D4752 (MEK double rub) paint durability tests.
          2. The paint film thickness shall be a minimum of 2.0 mils.
          3. The finish shall have a hardness of 2H.
          4. The finish shall withstand a minimum salt spray exposure of 1000 hours.
          5. The finish shall have an impact resistance of 80 in-lb.
    2. Options:
       1. LED Color Temperature:
          1. LED lighting shall have a nominal Correlated Color Temperature (CCT) of [5000K – 5000 Kelvin].
          2. Optional CCT of [4000K] and green lighting available upon request.
       2. LED Rows:
          1. The diffuser module shall be provided with [1 - Single Row] or [2 - Dual Row] of LED lighting, pursuant to the lighting requirements for the application.
       3. LED Driver location:
          1. The LED driver(s) shall either be mounted on top of the diffuser [LOCAL – Top Mount] or mounted remotely in a remote driver cabinet [REMOTE – Remote Mount].
       4. LED Driver Access:
          1. LED driver(s) shall be accessible from the top [T – Top Access] or both top & roomside of the diffuser module [T+R – Top and Roomside Access].
       5. LED Dimming Control:
          1. Integrated lighting shall either be controlled via wall dimmer switch supplied by manufacturer [DIMMER – Wall Dimmer Switch] or by others to be supplied in the field [FIELD – Field Supplied].
       6. Voltage:
          1. Diffuser lighting shall be provided with single point [120VAC] or [277VAC] connection.

**PART 3 – EXECUTION**

**3.01 Examination**

1. Verify that conditions are suitable for installation.
2. Verify that field measurements are as shown on the drawings.

**3.02 Installation**

1. Install in accordance with manufacturer’s instructions.
2. See drawings for the size(s) and locations of laminar flow diffuser inlets.
3. Support components individually from structure in accordance with SMACNA (SRM).
4. Do not support components from ductwork.
5. Connect to ductwork in accordance with Section 203 31 00.

**3.03 Adjusting**

1. Ensure supply air to the laminar flow diffusers by performing pitot traverse of the main supply duct.
2. Balance outlets according to manufacturer’s recommendations.
3. Verify that field measurements are as shown on the drawings.

**3.04 Field Quality Control**

1. See Section 01 40 00 – Quality Requirements for additional requirements.

**3.05 Cleaning**

1. See Section 01 74 19 – Construction Waste Management and Disposal for additional requirements.

**3.06 Closeout Activities**

1. See Section 01 78 00 – Closeout Submittals for closeout documentation requirements.
2. See Section 01 79 00 – Demonstration and Training for additional requirements.