**Price LFDC Laminar Flow Diffuser**

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

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

The following specification is for a defined application. Price 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 high efficiency filter.

**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**

A. ASHRAE Standard 55 – Thermal Environmental Conditions for Human Occupancy; 2013

B. ASHRAE Standard 70 – Method of Testing the Performance of Air Outlets and Air Inlets; 2006

C. ASHRAE Standard 170 – Ventilation of Health Care Facilities; 2013

D. ASTM Standard E84 – Standard Test Method for Surface Burning Characteristics of Building Materials; 2016

E. ASTM D1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes; 2013

F. ASTM D4752 – Standard Practice for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub; 2015

G. CSA Standard Z317.2-10 – Special Requirements for Heating, Ventilation, and Air-conditioning (HVAC) Systems in Health Care Facilities; 2010

H. NFPA Standard 90A – Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015

I. SMACNA (SRM) – Seismic Restraint Manual Guidelines for Mechanical Systems; Sheet Metal and Air Conditioning Contractors’ National Association; 2008

J. UL Standard 723 – Standard for Test for Surface Burning Characteristics of Building Materials; 2008

**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, and

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 78 00 - Closeout Submittals, for additional warranty requirements.
2. Price Industries warrants that, at the time of shipment, the LFDC will be free from defects arising from manufacturing, workmanship, or a failure to adhere to Price Industries’ published catalog specifications and specified material. If Price Industries is notified in writing of any such defect within (1) year from the date of shipment, Price Industries will, at its sole option, repair, replace, or refund the purchase price paid by the Representative for the Product. Such remedies are the exclusive remedies available under this warranty.

**PART 2 – PRODUCTS**

**2.01** **Laminar Flow Diffuser with High Efficiency Filter**

1. Basis of Design: Price Industries, Inc.
2. Laminar flow diffuser with high efficiency filter: Model LFDC, LFDCSS
3. General:
4. The laminar flow diffusers shall be non-aspirating, unidirectional type, providing a filtered air at controlled low velocity with minimal entrainment of room air to satisfy the requirements of ASHRAE Standard 170.
5. Laminar Flow Diffusers [Price Model LFDC, LFDCSS]:
	1. Plenum material shall be one of the following options:
		1. Aluminum
		2. 304 Stainless steel
	2. Face and frame material shall be one of the following options:
		1. Aluminum
		2. 304 stainless steel
	3. Construction
		1. Plenums shall have an airtight seal preventing contaminants in the interstitial space from being drawn into the diffuser plenum and mixing with conditioned air that is being delivered to the clean space.
		2. A diffuser knife edge shall be integral to the mounting frame, penetrating a silicone or urethane gel seal to prevent leakage between the filter and housing.
		3. Plenum and knife edge shall be factory PAO scanned according to standard IEST-RP-CCO34.3 to ensure a leak free assembly.
		4. A static pressure port accessible from the room side shall be factory supplied to measure pressure drop across the filter, and to sample aerosol concentrations before the filter.
		5. Air shall be admitted to the plenum through an inlet collar and an optional butterfly style volume control damper.
		6. The diffuser plenum shall feature four (4) integral hanger tabs for securing the unit to structural supports above the ceiling.
		7. Mounting frames shall utilize corner alignment brackets.
		8. Four (4) thumb wheel retainers hold the filter in the housing, allowing filter removal and replacement without disturbing the ceiling seal or duct connections.
		9. The 51% free-area perforated distribution plate shall be secured to the face using quarter-turn fasteners with anti-slip, snap-in retainers and stainless steel retainer cables for ease of installation and removal.
		10. Filter type shall be selected from one of the following filter options based on particulate size and efficiency:
			1. High Efficiency (HE) filter shall provide 95% efficiency on .30 μm particulate.
			2. High Efficiency Particulate Air (HEPA) filter shall provide 99.99% efficiency on .30 μm particulate.
			3. Ultra-Low Penetration Air (ULPA) filter shall provide 99.9995% efficiency on .12 μm particulate.
	4. Plenum Finish shall be one of the following:
		1. All aluminum components shall have a white [B12 Standard White] or [B11 Pure White] 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. All aluminum components shall have a baked-on powder coat finish in a color to match a customer supplied sample.
		3. Stainless steel with mill finish.
	5. Face and frame finish shall be one of the following:
		1. All aluminum components shall have a white [B12 Standard White] or [B11 Pure White] 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. All aluminum components shall have a baked-on powder coat finish in a color to match a customer supplied sample.
		3. Stainless steel with #4 brushed finish on all exposed surfaces.
	6. Options:
		1. LED status indicator light shall be either factory supplied or loose shipped for field installation.
			1. The LED indicator light shall be visible from the occupied area to determine the filter loading status or the motor status without opening the diffuser.
			2. The LED light shall turn from green to yellow when the pressure drop across the filter exceeds the specified limit.
			3. The LED kit shall turn from green to red to indicate the motor is not functioning.
			4. The LED kit shall be provided with a switch, factory pre-calibrated for 150% of initial clean filter pressure drop.
			5. The LED kit shall operate on a 24 VAC power supply, provided by others.
		2. External Insulation
			1. The diffuser plenum shall be externally insulated with ½” aluminum foil-backed fiberglass insulation
			2. Insulation shall not contain formaldehyde.
			3. Insulation and adhesive surface burning characteristics shall have a maximum flame/smoke spread of 25/50 when tested in accordance with ASTM E84. Secure insulation with adhesive. Coat edges exposed to airstream with NFPA 90A approved sealant.
			4. Insulation shall meet the requirements of ASTM-84 and UL 723.
		3. Volume Control Damper
			1. The volume control damper shall be adjustable from the room side with removal of the diffuser face.
			2. The operator shaft shall be positively sealed against leakage.
			3. The damper finish shall be (**select one**):
				1. Standard white baked-on powder finish.
				2. Stainless steel construction.
		4. Quarter-turn fastener material shall be (**select one**):
			1. Plated steel construction
			2. Stainless steel construction
		5. Inlet Diffusion basket
			1. The diffusion basket shall equalize air distribution over the filter media to improve filter loading and extend filter life.
		6. Aerosol test system:
			1. An aerosol test system shall be provided for injecting aerosol challenge into the diffuser from the room side to allow the filter and housing to be scanned for leaks during commissioning or after filter replacement.
			2. Aerosol concentrations upstream of the filter shall be sampled through the static port.

**PART 3 – EXECUTION**

**3.01 Examination**

 A. Verify that conditions are suitable for installation.

 B. 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.