**Price Radial Flow Diffusers**

***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. Radial Flow Diffusers.

**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 volume flow, initial pressure drop, sound performance, and throw, as tested in accordance with ASHRAE Standard 70-2006.

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 78 00 - Closeout Submittals, for additional warranty requirements.
2. Price Industries warrants that, at the time of shipment, the RFD 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** **Radial Flow Diffusers**

1. Basis of Design: Price Industries, Inc.
2. Radial Flow Diffuser: Models RFD
3. Radial Flow Diffuser with Cleanroom Filter: Models RFDC
4. Flush Face Radial Flow Diffuser: Models FRFD
5. Flush Face Radial Flow Diffuser with Cleanroom Filter: Models FRFDC
6. General:
	1. The radial flow diffusers shall provide a low velocity, radial air pattern for minimal entrainment of room air.
7. Performance:
	1. The manufacturer of the radial flow diffuser shall provide performance data for air volume, initial pressure drop, sound levels, and throw. All data must be tested in accordance with the most recent publication of ASHRAE Standard 70.
8. Radial Flow Diffuser: Models RFD
	1. Supply and install Price RFD radial flow diffusers of the sizes, configurations, and capacities indicated on the drawings and/or diffuser schedule.
	2. Each diffuser air pattern shall be (**select one**):
		1. One-way half radial
		2. Two-way full radial
	3. Plenum material shall be (**select one**):
		1. Aluminum
		2. 304 Stainless steel
	4. Face and frame material shall be (**select one**):
		1. Aluminum
		2. 304 stainless steel
	5. Construction:
		1. The diffuser shall consist of a semi-cylindrical perforated face that extends below the ceiling by approximately 6 inches (152 mm) and includes an integral plenum with duct connection.
		2. Plenum shall be (**select one**):
			1. Spot welded
			2. Continuously welded
		3. Plenum shall be divided into an upper and lower chamber utilizing an internal pressure equalization baffle to promote uniform face velocity.
		4. Air shall be admitted to the top plenum chamber through an inlet collar and an optional butterfly style volume control damper.
		5. The diffuser plenum shall feature four (4) integral hanger tabs for securing the unit to structural supports above the ceiling.
		6. Mounting frames shall utilize corner alignment brackets.
		7. The face shall be perforated [aluminum or stainless steel]:
		8. The face shall incorporate engineered deflection vanes, stainless steel quarter-turn fasteners with anti-slip, snap-in retainers and stainless steel retainer cables for ease of installation, removal and damper access.
		9. The plenum shall be fully accessible for cleaning without moving the backpan/plenum.
	6. Finish (**select one**):
		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. All stainless steel components shall have a #4 polished finish on exposed surfaces.
	7. Options:
		1. External Insulation
			1. The diffuser plenum shall be externally insulated with [½” or 1½” ] 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.
			4. Insulation shall meet the requirements of ASTM E84 and UL 723.
		2. Inlet damper
			1. The butterfly style damper shall be (**select one**):
				1. Steel construction with standard white B12 baked-on powder coat finish.
				2. Stainless steel construction with brushed finish.
		3. Protective Film
			1. The diffuser face and inlet shall be covered with an applied protective film.
9. Radial Flow Diffuser with Cleanroom Filter: Models RFDC
	1. Supply and install Price RFDC radial flow diffusers with cleanroom filter of the sizes, configurations, and capacities indicated on the drawings or diffuser schedule.
	2. Each diffuser air pattern shall be (**select one**):
		1. One-way half radial
		2. Two-way full radial
	3. Plenum and Frame material shall be (**select one**):
		1. Aluminum
		2. Stainless Steel
	4. Face material shall be (**select one**):
		1. Aluminum
		2. Stainless Steel
	5. Construction:
		1. The diffuser shall consist of a semi cylindrical perforated face, an airtight filter housing, and a replaceable high efficiency filter.
		2. The border shall be stainless steel or an extruded aluminum construction with an integral knife edge flange which penetrates gel in the filter frame to provide a leak-proof seal.
		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. The diffuser face shall be semi-cylindrical perforated aluminum or stainless steel that extends below the ceiling by approximately 6 inches (152 mm) and includes an integral plenum with duct connections.
		6. The face shall incorporate engineered deflection vanes, stainless steel quarter-turn fasteners with anti-slip, snap-in retainers and stainless steel retainer cables for ease of installation, removal and damper access.
		7. The plenum shall be fully accessible for cleaning with no internal baffles or obstructions.
		8. Room side access shall be available to the interior of the unit without removing the plenum.
		9. Mounting frames shall be provided for surface mounting.
	6. Filter:
		1. The filter shall be a two inch thick pleated microglass element in a three inch deep anodized aluminum frame.
		2. The filter shall have an integral cavity filled with gel which shall provide a leak tight seal between the filter frame and the border.
		3. The filter border shall have an integral knife edge flange which penetrates a silicone gel in the filter frame to provide a leak-proof seal.
		4. Filters shall be packaged separately from the filter housing in a factory carton until site conditions are appropriate for installation (by others) of the filter in the housing.
		5. The filter shall be held in place by four cam-type retainers which can be turned 90 degrees by hand, providing an easy means of removing and replacing filters without disturbing the filter housing in the ceiling or the duct connection.
		6. The filter shall be individually tested for particle penetration and initial air flow resistance, and shall be of type (**select one**):
			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 0.30 μm particulate.
			3. Ultra-Low Penetration Air (ULPA) filter shall provide 99.9995% efficiency on 0.12 μm particulate.
	7. Plenum 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 mill finish.
	8. Face 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
	9. Options:
		1. External Insulation
			1. The diffuser plenum shall be externally insulated with [½” or 1½” ] 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.
			4. Insulation shall meet the requirements of ASTM-84 and UL 723.
		2. 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.
		3. 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.
		4. 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.
		5. Protective Film
			1. The diffuser face and inlet shall be covered with an applied protective film.
10. Flush Face Radial Flow Diffuser: Models FRFD
	1. Supply and install Price FRFD flush face radial flow diffusers of the sizes, configurations, and capacities indicated on the drawings and/or diffuser schedule.
	2. Each diffuser air pattern shall be (**select one**):
		1. One-way half radial
		2. Two-way full radial
	3. Face Style shall be (**select one**):
		1. Flush Angled Deflector Vanes
		2. Perforated Face
	4. Plenum and equalization baffle material shall be (**select one**):
		1. Steel
		2. Aluminum
		3. Stainless Steel
	5. Diffuser frame, border, deflector blades and/or perforated face material shall be (**select one**):
		1. Aluminum
		2. Stainless Steel
	6. Construction:
		1. Plenum shall be (**select one**)
			1. Spot welded
			2. Continuously welded – *stainless steel & aluminum units only*
		2. The face shall lay even with the ceiling line, with no part of the diffuser projecting below the ceiling system.
		3. The face shall incorporate engineered deflection vanes, stainless steel quarter-turn fasteners with anti-slip, snap-in retainers and stainless steel retainer cables for ease of installation, removal and damper access.
		4. The diffuser plenum shall feature four (4) integral hanger tabs for securing the unit to structural supports above the ceiling.
		5. The diffuser air deflector blades shall be located below an equalization baffle.
11. The equalization baffle and plenum shall be fully accessible for cleaning with no internal baffles or obstructions, and provided in (**select one**):
	* + - 1. Aluminum
				2. Stainless steel
	1. Plenum Finish (**select one**):
		1. All steel, stainless steel and aluminum plenums shall have a white [B12 Standard 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 steel, stainless steel and aluminum plenums shall have a baked-on powder coat finish in a color to match a customer supplied sample.
		3. Stainless steel plenums shall have a mill finish.
	2. Diffuser Finish (**select one**):
		1. All aluminum and stainless steel 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. All stainless steel components shall have #4 polished finish on exposed surfaces.
	3. Options:
		1. 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.
			4. Insulation shall meet the requirements of ASTM-84 and UL 723.
		2. Inlet Damper
			1. The butterfly style damper shall be (**select one**):
				1. Steel construction with standard white B12 baked-on powder coat finish.
				2. Stainless steel construction with brushed finish.
		3. Protective Film
			1. The diffuser face and inlet shall be covered with an applied protective film.
12. Flush Face Radial Flow Diffuser with Cleanroom Filter: Models FRFDC
	1. Supply and install Price FRFDC flush face radial flow diffusers with cleanroom filter of the sizes, configurations, and capacities indicated on the drawings and/or diffuser schedule
	2. Each diffuser air pattern shall be (**select one**):
		1. One-way half radial
		2. Two-way full radial
	3. Face Style shall be (**select one**):
		1. Flush Angled Deflector Vanes
		2. Perforated Face
	4. Plenum and Frame material shall be (**select one**):
		1. Aluminum
		2. Stainless Steel
	5. Face material shall be (**select one**):
		1. Aluminum
		2. Stainless Steel
	6. Construction:
		1. The diffuser shall consist of a perforated or angled deflector face, airtight filter housing, and replaceable high efficiency filter.
		2. The face of the diffuser shall lay even with the ceiling line, with no part of the diffuser projecting below the ceiling system.
		3. The border shall be stainless steel or an extruded aluminum construction with an integral knife edge flange which penetrates gel in the filter frame to provide a leak-proof seal.
		4. Plenum and knife edge shall be factory PAO scanned according to standard IEST-RP-CCO34.3 to ensure a leak free assembly.
		5. 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.
		6. The face shall incorporate engineered deflection vanes, stainless steel quarter-turn fasteners with anti-slip, snap-in retainers and stainless steel retainer cables for ease of installation, removal and damper access.
		7. The inlet collar shall be sealed to the top of the filter housing.
		8. The diffuser air deflector vanes shall be located below an equalization baffle.
		9. The plenum shall be fully accessible for cleaning with no internal baffles or obstructions.
		10. Mounting frames shall be provided for surface mounting.
	7. Filter:
		1. The filter shall be a two inch thick pleated microglass element in a three inch deep anodized aluminum frame.
		2. The filter shall have an integral cavity filled with gel which shall provide a leak tight seal between the filter frame and the border.
		3. The filter border shall have an integral knife edge flange which penetrates a silicone gel in the filter frame to provide a leak-proof seal.
		4. Filters shall be packaged separately from the filter housing in a factory carton until site conditions are appropriate for installation (by others) of the filter in the housing.
		5. The filter shall be held in place by four cam-type retainers which can be turned 90 degrees by hand, providing an easy means of removing and replacing filters without disturbing the filter housing in the ceiling or the duct connection.
		6. The filter shall be individually tested for particle penetration and initial air flow resistance, and shall be of type (**select one**):
			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 0.30 μm particulate.
			3. Ultra-Low Penetration Air (ULPA) filter shall provide 99.9995% efficiency on 0.12 μm particulate.
	8. Plenum 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 mill finish.
	9. Face 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
	10. Options:
		1. External Insulation
			1. The diffuser plenum shall be externally insulated with [½” or 1½”] 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.
			4. Insulation shall meet the requirements of ASTM-84 and UL 723.
		2. 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.
		3. 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.
		4. 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.
		5. Protective Film
			1. The diffuser face and inlet shall be covered with an applied protective film.

**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 23 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.