**Price Underfloor Deflection Grilles**

**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. **Summary**
1. This section includes the following:
	* + 1. Underfloor Deflection Grilles

**1.02 Related Documents**

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 19 – Construction/Demolition Waste Management and Disposal
5. Section 01 78 00 – Closeout Submittals
6. Section 01 79 00 – Demonstration and Training
7. Section 23 30 00 – HVAC Air Distribution
8. Section 23 32 00 – Air Plenums and Chases
	1. **Reference Standards**
9. All referenced standards and recommended practices in this section pertain to the most recent publication thereof, including all addenda and errata.
10. ASHRAE Standard 55 – Thermal Environmental Conditions for Human Occupancy
11. ASHRAE Standard 62.1 – Standards for Ventilation and Indoor Air Quality
12. ASHRAE Standard 70 – Method of Testing the Performance of Air Outlets and Air Inlets
13. ASTM Standard D610 – Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces
14. ASTM Standard D714 – Standard Test Method for Evaluating Degree of Blistering of Paints
15. ASTM Standard D1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
16. ASTM Standard D1654 – Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
17. ASTM Standard D4752 – Standard Practice for Measuring MEK Resistance of Ethyl Silicate (Inorganic) Zinc-Rich Primers by Solvent Rub
18. ASTM Standard E84 – Standard Test Method for Surface Burning Characteristics of Building Materials
19. NFPA Standard 70A, Article 100 – National Electrical Code

**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**

1. Product Data: For each type of product indicated, include rated capacities, furnished specialties and accessories.
2. Shop Drawings: For each type of product indicated, include the following:
3. Detail equipment assemblies and indicated dimensions.
4. Required clearances.
5. Method of field assembly.
6. Revit models.
7. Coordination Drawings:
8. Include floor plans, and other details, drawn to scale, one which the following items are shown and coordinated with each other, based on input from installers of the items involved:
	* + - 1. Floor or underfloor-mounted items including;

Floor structure (floor tiles, concrete, etc.)

Floor finishing (carpet, tile, etc.)

Access panels

Electrical components

Plumbing

Networking components

Terminal Units and other HVAC components

1. Operation and Maintenance Data: To include in emergency, operation and maintenance manuals, maintenance schedules and repair part lists for all parts.

**1.04 Quality Assurance**

1. Product Options: Include drawings indicating size, profiles and dimensional requirements of the linear floor heaters that are based on the specific system indicated.
2. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100 by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

**1.05 Coordination**

1. Coordinate layout and installation of underfloor deflection grilles with other construction that penetrates flooring, including but not limited to: electrical fixtures, network equipment, HVAC equipment, and partition assemblies.
2. Specific configuration of the supply and return ductwork, electrical work, and piping at each unit has been indicated on the drawings. If the configuration of the units furnished on the project differs from that indicated on the drawings (whether or not the units furnished are the specific units or an acceptable substitute), it shall be the contractor’s responsibility to modify ductwork, piping, etc., as required to accommodate the actual configuration of units furnished on the project.

**PART 2 – PRODUCTS**

**2.01 General**

1. Manufacturer shall be responsible for examining applications of each type of unit to assure that each will operate properly in the intended application.
2. Unit sizes are shown as selected in accordance with the principles set forth in the ASHRAE Guide and manufacturer’s literature.
3. All items of a given type shall be the products of the same manufacturer.

**2.02 Manufacturers**

* 1. Basis of Design: Price Industries, Inc.
		+ 1. Pressure Control Unit [Price Model PCU]
			2. Underfloor Deflection Grille [Price Model DGU]
			3. Underfloor Deflection Grille with Damper [Price Model DGD]
	2. General Product Information:
1. Furnish and install Price underfloor deflection grilles of the sizes and capacities indicated on the drawings or outlet schedule.
2. Unit sizes shall be selected in accordance with ASHRAE guidelines and manufacturer’s literature.
3. Manufacturers shall demonstrate that they have successfully supplied and installed underfloor HVAC products, as well as the computer modeling thereof for a minimum of 10 years.
4. Manufacturers must be pre-qualified to bid based on the completion of a minimum of [xx] jobs in similar climates.
5. Manufacturers shall provide a list of completed jobs and references.
	1. **PCU Pressure Control Unit**
		* 1. Description:
				1. Furnish and install Price model PCU pressure control unit, with the voltage, wiring, and configurations indicated on the plans and controllers schedule.
				2. The PCU shall be a dedicated, micro-processor-based modulation controller mounted in the underfloor plenum. The controller shall modulate the actuators of up to twelve Deflection Grilles with Damper (DGD) or VFD based on the pressure signal from the relative pressure nodes (RPN), and shall have the following technical specifications:
6. Inputs: 4 analog inputs – 10 bit plus 2 binary inputs
7. Outputs: 8 binary triac outputs (24 VAC, max 5A each) plus 3 universal outputs
8. Power: 24 VAC with visual LED status, 5 VA (not including output loading),
9. Ambient Ratings: 32 to 131 degrees Fahrenheit (0 to 55 degrees Celcius), 10 to 90 percent relative humidity (non-condensing)
10. Technology: 8-bit microprocessor
11. Connections: 2 RJ45 connectors, 2 MTA156 connectors, 2 MTA100 connectors, and pluggable screw type terminal connectors
12. Wiring: Class II
13. Size (including housing): 1.25 x 11.13 x 5.79 in (32 x 283 x 147mm)
14. Weight: 0.64 pound (290 grams)
	* + - 1. The controller shall house input terminations for the input signals and up to three analog peripheral devices, such as temperature probes, differential pressure sensor or connection to contact closure night setback.
				2. The PCU shall house the peripheral RJ12 type terminations for plug-and-play wiring of up to twelve DGD units. The PCU shall have LED display lights to indicate availability of control power.
				3. All components shall be factory wired, calibrated and pre-tested to ensure a fully functional unit. The PCU shall be ETL listed to UL 1995 and CSA C22.2. All control components shall be mounted inside a protective metal enclosure.
				4. The PCU control package shall include a remote Price [LCD] or [Motion Sensor with LCD] Thermostat mounted in the occupied zone and a box mounted modulation controller. The control package shall also include a thirty-five foot plenum rated thermostat cable with plug-and-play connectors.
				5. The PCU controller shall be configurable in the field with either the LCD thermostat, service port or the BACnet BAS network. BACnet BAS integration to be provided by Controls Contractor. The LCD thermostat will allow setup and balancing of the PCU controller, without need to access the plenum space. The LCD setup shall include a zone temperature sensor, set point adjust, and character LCD display and a service port for computer access to the PCU controller. The configurable LCD + key pad combination shall allow for the following on screen functions/modes:
				6. Customer Mode
15. Temperature
16. Space Temperature/Set-point display
17. Set-point adjustment

Static Pressure

1. Static Plenum Pressure/Set-point display
2. Set-point adjustment
	* + - 1. Service and Commissioning Mode (password protected)
3. Control sequence diagnostics
4. Minimum/maximum static pressure setting/ reading
5. Control of VAV damper position over entire stroke (Manual Force to min/max flow, or min/max position/ Automatic Mode)
6. Balancing
	* + - 1. Configuration Mode (password protected)
7. Sequence of operation programming
8. Network configuration
9. Display option configuration
10. The programmable controller shall be used in either a stand-alone operation or a peer-to-peer building automation networked architecture. The RS-485 network port will allow for plug in connection onto a BACnet MS/TP LAN. The service port (RJ12) will allow for the connection of a personal computer. Connection at the service port will allow for the full display of all VAV control parameters and inputs/outputs.
11. The Relative Pressure Node (RPN) shall consist of a very low pressure transducer for air pressure ranges from 0 - 0.25 inches water gauge. Static accuracy shall be ±1% full scale in normal ambient temperature environments.
	1. The RPN sensor shall utilize an all stainless steel micro-tig welded sensor.
	2. The units shall be temperature compensated to less than ±0.033 percent FS/°F of thermal error over the temperature range of 0 to +150 degrees Fahrenheit.
	3. The pressure sensor shall be installed on a factory supplied blank-off plate which shall include a pitot tube for measurement of the underfloor static pressure. The pitot tube shall be connected to the RPN sensor via clear tubing provided by the manufacturer.

**2.04 DGU Underfloor Deflection Grille**

1. Description:
	1. Furnish and install Price model DGU (L x W) with the sizes, configurations and capacities indicated on the plans and air outlet schedule.
2. Performance:
	1. Diffuser manufacturer shall provide sound and pressure drop data derived from tests in accordance with ASHRAE 70.
3. Construction:
	1. Grille shall be constructed of streamlined 1¼ inch (32 millimeters) blades positioned on 1½ inch (38 millimeters) centers.
	2. Blades shall be individually adjustable and shall lock into position at 0, 15, 30 and 45 degrees deflection in both directions.
	3. Blade indexing device shall be constructed of stainless steel. All other components shall be steel.
	4. Plastic components shall not be acceptable.
4. Finish:
	1. The grille shall have a mill finish.
	2. (**Optional**): The grille shall have a 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 with no measurable creep in accordance with ASTM D1654, and 1000 hours of exposure with no rusting or blistering as per ASTM D610 and ASTM D714.
				5. The finish shall have an impact resistance of 80 inch-pounds.
5. Mounting/Fastening:
	* + 1. The grille shall be attached to the ductwork with screws appropriate for the application, as chosen by the sheet metal installer.

**2.05 DGD Underfloor Deflection Grille with Damper**

1. Description:
	1. Furnish and install Price model DGD (L x W) with the sizes, configurations and capacities indicated on the plans and air outlet schedule.
2. Performance:
	1. Air shall be delivered to the space at low noise levels without the use of nozzles. Diffuser manufacturer shall provide sound and pressure drop data derived from tests in accordance with ASHRAE 70.
3. Construction:
4. Grille shall be constructed of streamlined 1¼ inch (32 millimeters) blades positioned on 1½ inch (38 millimeters) centers.
5. Blades shall be individually adjustable and shall lock into position at 0, 15, 30 and 45 degrees deflection in both directions.
6. Blade indexing device shall be constructed of stainless steel. All other components shall be steel.
7. Plastic components shall not be acceptable.
8. Damper:
	1. The grille shall be supplied with a galvanized steel opposed-blade type damper, complete with galvanized steel triple-vee blades. The damper and grille shall be enclosed within a galvanized steel sleeve.
	2. The damper shall be controlled by a 24 VAC, non-spring return, floating control actuator.
	3. The terminal block connections shall be factory wired.
	4. The assembly shall be equipped with a plug-and-play RJ12 board.
9. Finish:
	* + 1. The grille shall have a mill finish.
			2. (**Optional**): The grille shall have a 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 with no measurable creep in accordance with ASTM D1654, and 1000 hours of exposure with no rusting or blistering as per ASTM D610 and ASTM D714.
				5. The finish shall have an impact resistance of 80 inch-pounds.
10. Mounting/Fastening: The grille shall be attached to the ductwork with screws appropriate for the application, as chosen by the sheet metal installer.

**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       Manufacturer’s Field Services

* + 1. The manufacturer shall provide the services of an underfloor air systems specialist. This engineer shall make at a minimum the following trips to the site with construction and design personnel.
			1. The first trip to the job shall occur right before the raised access floor is being installed. The Price engineer will inspect and ensure proper installation of Price products. While on site, the Price engineer will also inspect the area near the Price products for any obvious concerns with construction within the underfloor plenum in regards to the air tightness of the plenum. Any deficiencies found shall be brought to the general contractor's attention on site that day. Site observation report shall be made and emailed to the Engineer of Record for approval. If approved they shall forward the report to the construction team as appropriate. The Price engineer will address any issues regarding the equipment supplied by Price to help ensure a successful completion of the project. Price will not be held liable for issues outside of the operation of the product supplied by Price.
			2. The second trip to the job shall occur during the building commissioning process. The engineer shall verify proper operation and installation of the Price supplied equipment and assist to solve problems that may prevent project completion due to said equipment. Any deficiencies found shall be brought to the general contractor's attention on site that day. Site observation report shall be made and emailed to the Engineer of Record for approval. If approved they shall forward the report to the construction team as appropriate. The Price engineer will address any issues regarding the goods supplied by Price to help ensure a successful completion of the project. Price will not be held liable for issues outside of the operation of the product supplied by Price.

**3.03 Installation**

1. Install underfloor deflection grilles level and plumb. Maintain sufficient clearance for normal services, maintenance, or in accordance with construction drawings.
2. Complete installation and startup checks according to manufacturer’s instructions and perform the following:
	1. Verify that inlet duct connections are as recommended by manufacture to achieve proper performance.
	2. Verify that any identification tags are visible.
	3. Verify locations of thermostats, humidistats, and other exposed control sensors with drawings and room details before installation.

**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.