**Price Linear Plenum Terminal**

**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:
2. Linear Plenum Terminal.

**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. See Section 01 30 00 – Administrative Requirements for submittal procedures.
2. Product Data:
	1. Provide data indicating configuration, general assembly, materials used in fabrication, rated capacities, and furnished specialties and accessories.
	2. Include drawings indicating size, profiles and dimensional requirements of the linear floor grilles that are based on the specific system indicated.
	3. Include catalog performance ratings that indicate air volume flow, initial pressure drops, sound performance, and throw, as tested in accordance with ASHRAE 70.
3. Shop Drawings: For each type of product indicated, include the following:

1. Equipment assemblies and indicated dimensions.

2. Required clearances.

3. Method of field assembly.

4. Revit models.

1. Coordination Drawings:
	1. Include floor plans, and other details, drawn to scale, on which the following items are shown and coordinated based on input from installers:
	2. Floor or underfloor-mounted items including:
		* 1. Floor structure (floor tiles, concrete, etc.)
			2. Floor finishing (carpet, tile, etc.)
			3. Access panels
			4. Electrical components
			5. Plumbing
			6. Networking components
			7. Terminal Units and other HVAC components
2. Operation and Maintenance Data: Include manufacturer’s descriptive literature, operating instructions, maintenance schedules and repair data, and parts lists.

**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.
3. 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.

**1.07 Warranty**

1. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
2. Provide 18 month manufacturer warranty from date of shipment for grilles and registers.

**PART 2 – PRODUCTS**

**2.01 General**

1. Basis of Design: Price Industries, Inc.
2. Linear Plenum Terminal with VAV plenum cooling [Price Model LPT-VC]
3. Linear Plenum Terminal with ducted heat and VAV plenum cooling [Price Model LPT-HC]
4. General Product Information:
5. Furnish and install Price model LPT linear floor plenums of the sizes and capacities indicated on the drawings or outlet schedule.
6. Unit sizes shall be selected in accordance with ASHRAE guidelines and manufacturer’s literature.
7. 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.
8. Manufacturers must be pre-qualified to bid based on the completion of a minimum of [xx] jobs in similar climates.
9. Manufacturers shall provide a list of completed jobs and references.
10. Underfloor Air System Controls:
	1. Air Grilles and diffusers specified for underfloor service shall incorporate the following requirements:
	2. Damper construction shall include an integral flow-modulation damper and motor (air valve) that is specifically designed for low static pressure air distribution.
	3. Air dampers shall not include fast acting actuators that require high life cycle ratings.
	4. Flow-modulation with constant plenum air temperature shall reduce airflow and throw heights in response to lower space demands. Flow-modulation technique shall be implemented to maximize stratification, leading to energy savings and increased thermal comfort.
	5. Modulation by timed duty cycle of fully open and closed periods shall not be acceptable. This type of modulation can greatly reduce stratification, removing potential energy savings. Timed duty cycle modulation also increases the possibility of creating stagnant zones and starving buoyancy driven flow. Any use of this type of modulation shall be modified in order to demonstrate stratification to the project team prior to being considered acceptable.
	6. Plenum Rated Cables: Color-coded plug-and-play plenum rated cables with [RJ12] or [RJ45] connectors shall be used between devices.
	7. Terminal block type plugs shall not be acceptable.
	8. Plug-and-Play cables shall carry both the power and control signal to each device and connect to a single port on the device control board.
	9. Cable types shall be limited to no more than one type and connector per device to reduce complexity in wiring and future modifications.
	10. Cables shall be stranded wire to increase flexibility in the wires, to improve ease of installation, and reduce damage during installation.
	11. Cables shall have six wires with redundant wires to provide a more robust system and protection against damage, and to allow the current for multiple devices to be controlled through a single cable. Solid wires shall not be acceptable.
	12. The Power and Control Module shall include a direct digital controller (DDC) and transformer to supply both power and control signals to air devices.

**2.02 Linear Plenum Terminal with VAV Plenum Cooling**

1. Description:
	1. Furnish and install Price model LPT-VC with the sizes, configurations and capacities indicated on the plans and air outlet schedule.
2. Performance:
3. The manufacturer of the linear floor grilles shall provide performance data for air volume, initial pressure drop, and sound levels.
4. Air shall be delivered to the space without the use of nozzles.
5. All data must be tested in accordance with the most recent publication of ASHRAE 70.
6. Construction:
7. The plenum shall be constructed of minimum 22 gauge steel.
8. The plenum shall have a finished height of 10-3/8 inches, and shall be suitable for installation above conduit in a twelve inch raised floor.
9. The cooling inlet shall be [11 inches x 6 inches] or [12 inches x 6 inches] with a gasket modulating damper for VAV control.
10. The LPT shall be supplied complete with a 24 volt AC floating point actuator furnished with two modular jacks for system connections and one 25 foot, plenum-rated, modular plug-in control cable.
	1. The CFLEX cable shall be 25 ft. in length and shall be plenum rated.
	2. Each cable shall have either [one] or [two] modular male plugs to interface with type RJ12 jacks for plug-and-play system connections.
	3. The CFLEX cable shall be constructed of six (6) individually insulated wires wrapped in an insulated jacket.
	4. Each wire shall be constructed of stranded copper fibers; solid core copper is not acceptable.
11. The plenum shall be [floor tile] or [pedestal] supported.
12. Pedestal support brackets shall be constructed from 16 gauge steel.
13. Finish:
14. The plenum shall be finished in pre-painted black powder coat.
15. Mounting/Fastening:
16. Floor tile supported units shall be supplied with a 1/2 inch flange on all sides.
17. Pedestal supported units shall be supplied with support brackets attached to the units.
18. Support pedestals shall be positioned without the use of tools.
19. Pedestal and pedestal heads shall be provided by others.
20. Options:
21. Control Cable:
22. CFLEX – 25 ft. Cable – plugs both ends (Default).
23. CFLEX – 25 ft. Cable - 1 plug and 1 stripped end.

**2.03 Linear Plenum Terminal with Ducted Heat and VAV Plenum Cooling**

1. Description:
	1. Furnish and install Price model LPT-HC with the sizes, configurations and capacities indicated on the plans and air outlet schedule.
2. Performance:
3. The manufacturer of the linear floor grilles shall provide performance data for air volume, initial pressure drop, and sound levels.
4. Air shall be delivered to the space without the use of nozzles.
5. All data must be tested in accordance with the most recent publication of ASHRAE 70.
6. Construction:
7. The plenum shall be constructed of minimum 22 gauge steel.
8. The plenum shall have a finished height of, and shall be suitable for installation above conduit in a twelve inch raised floor.
9. The cooling inlet shall be [11 inches x 6 inches] or [12 inches x 6 inches] with a gasketed modulating damper for VAV control and a nominal [6 inch] or [8 inch] heating inlet.
10. The LPT shall be supplied complete with a 24 volt AC floating point actuator furnished with two modular jacks for system connections and one 25 foot plenum rated modular plug-in control cable.
	1. The CFLEX cable shall be 25 ft. in length and shall be plenum rated.
	2. Each cable shall have either [one] or [two] modular male plugs to interface with type RJ12 jacks for plug-and-play system connections.
	3. The CFLEX cable shall be constructed of six (6) individually insulated wires wrapped in an insulated jacket.
	4. Each wire shall be constructed of stranded copper fibers; solid core copper is not acceptable.
11. The plenum shall be [floor tile] or [pedestal] supported.
12. Pedestal support brackets shall be constructed from 16 gauge steel.
13. Finish:
14. The plenum shall be finished in B17 Black Powder Coat.
15. Mounting/Fastening:
	1. Floor tile supported units shall be supplied with a 1/2 inch flange on all sides.
	2. Pedestal supported units shall be supplied with support brackets attached to the units.
	3. Support pedestals shall be positioned without the use of tools.
	4. Pedestal and pedestal heads shall be provided by others.

1. Options:
2. Control Cable:
3. CFLEX – 25 ft. Cable - plugs both ends (Default).
4. CFLEX – 25 ft. Cable - 1 plug and 1 stripped end.

**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 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.

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**3.03 Installation**

1. Install linear floor grilles level and plumb.
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.

1. Maintain sufficient clearance for normal services, maintenance, or in accordance with construction drawings.
2. See drawings for the size(s) and locations of linear floor grilles.
3. Connect to ductwork in accordance with Section 23 31 00.

**3.03 Adjusting**

1. Balance outlets according to manufacturer’s recommendations.
2. 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.