Tek-Air

PRD

Tek-Air's Aerodynamically Designed **P**ressure **R**egulating **D**evice

The Only Ventilation Control Air Valve With A 10 Year Warranty

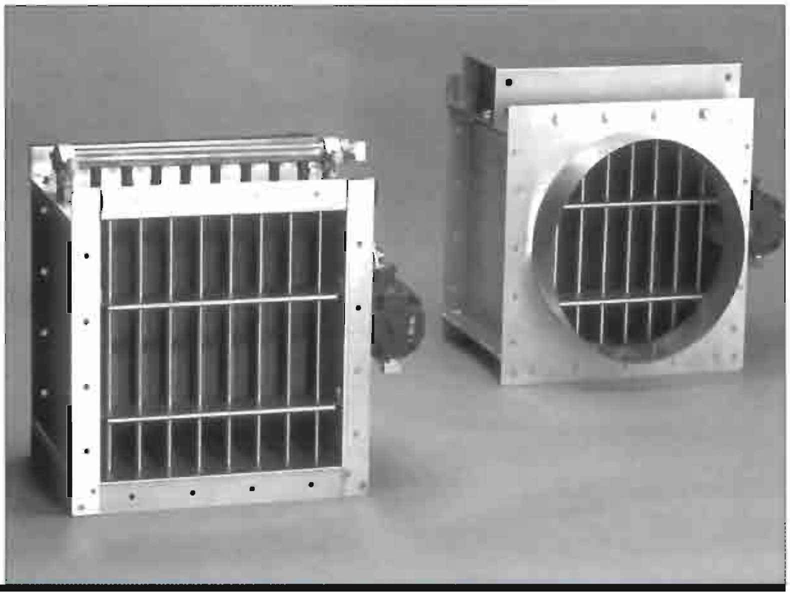
PRD

AIRFLOW CONTROL VALVE

The PRD (Pressure Regulating Device) is the finest air valve on the market today. Proven in over thirty years of applications, the superior features of the PRD have made it the valve of choice for today's most critical environments (BL-3 and BL-4 laboratories). Tek-Air's state-of-the-art manufacturing processes have made the PRD an economical product for all types of airflow control applications including general chemistry labs, isolation rooms, clean rooms and general industrial HVAC.

- **10 YEAR WARRANTY***
- **Aerodynamically designed**
- **Laminar airflow properties**
- **No motors or mechanical linkages**
- **Rugged construction**
- **Linear modulation**
- **Low sound levels**
- **Low insertion pressure loss**
- **Maintains operation at high static pressures**
- **Corrosion resistant airfoils**
- **Excellent shut off capability**
- **Low maintenance**

** See current price book for terms and conditions.*



Tek-Air Systems • With a Heritage in Airflow Applications

Founded in 1983, **Tek-Air Systems** entered the market specializing in the difficult airflow applications associated with Pharmaceutical Clean Rooms and High-Level Biological Labs, where product quality and test contamination are issues of critical importance. As technology advanced and markets grew, our expertise took us into the broader HVAC market as well as new specialized applications in laboratories and hospital isolation rooms. Tek-Air's innovation in sensing system design led to the development of our **VorTek** airflow sensors which use vortex shedding to measure air volume, and **Iso-Tek** pressure sensors which measure pressures as low as 0.0001"wc.

Each day these products assure the indoor air quality in hundreds of buildings, and protect the health and safety of thousands of laboratory and health-care workers.

In 1989 Tek-Air acquired Connor Engineering. Founded in 1916, Connor Engineering was a pioneer in the fields of aerodynamics and air purification/distribution. Today's **PRD,** and it's smooth, laminar airflow distribution characteristics are a result of a concentrated effort by Connor Engineering's team of aerodynamic engineers and Tek-Air's expertise in airflow technologies.

Combining the aerodynamic **PRD** with Tek-Air's patented **VorTek** flow feedback sensor has provided the critical environments industry with a cost effective, premier system for maximizing employee safety and minimizing energy costs.

A. 6" x 4" Rectangular PRD

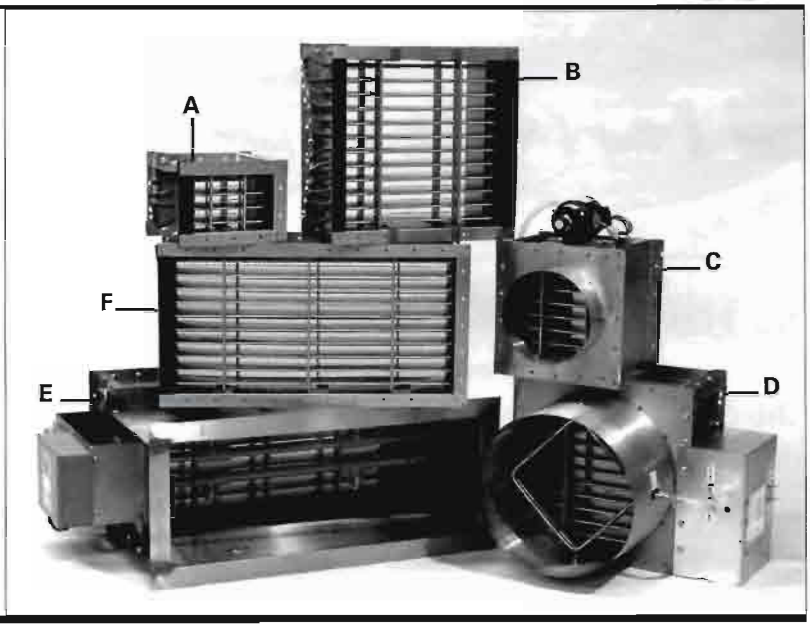
B. 16" x 16" Square PRD

C. 8" Round Fume Hood Valve with factory-mounted Industrial I/P

D. 12" Round PRD with Diamond Sensor and CP-42 Pneumatic Airflow Controller (PCP1000 series)

E. 24" x 10" Rectangular PRD with integral VorTek airflow (PVT2000 series)

F. 20" x 10" Rectangular PRD



Description

The **PRD** remains the air valve of choice for critical heating, ventilating, and air conditioning (HVAC) applications. The unique operating principle and aerodynamic design make it ideally suited for difficult applications where long term performance is critical to system performance.

Seventy standard sizes provide the ability to select valves over the range of 50 to 12,000 cubic feet per minute. Should greater volumes be required, individual valves can be assembled together to achieve almost any capacity. Construction materials include galvanized or stainless steel casing with aluminum or stainless steel airfoils.

Airflow is modulated by a series of expanding airfoils. The airfoil shape contributes to the low pressure loss, significantly reduced discharge noise levels, and low turbulence. Placement of the airfoils provides for a uniform airflow profile across the inlet face and discharge of the air valve. Because modulation is not dependent on bearings, levers, springs, or other mechanical devices, the valve's internal structure may be subjected to the build-up of coatings and particulate, yet operation will not be adversely effected.

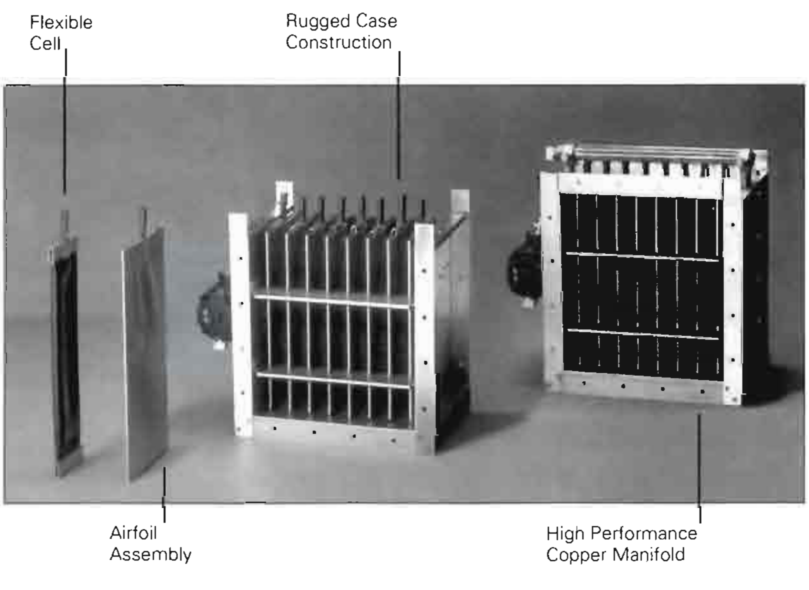
Because **PRDs** are typically used in conjunction with either airflow volume or pressure controls, a wide variety of options are provided to accommodate sensor mounting in the inlet of the air valve. Additionally, Tek-Air can provide valve mounted control options as simple as single loop pneumatic controls or as sophisticated as Tek-Air's microprocessor based **"SmartLab"** technology.

Design

The heart of each **PRD** is the aerodynamically designed airfoil assembly (see **Fig. A**). Each airfoil assembly consists of a flexible cell with end clips, and two airfoil covers. The flexible cells are manufactured of EPDM (Ethylene Propylene Diene Methylene) rubber. Chosen for its superior oxidation and corrosion resistance, EPDM cells have been in service in applications like chemical fume hoods for over thirty years. Flexible cell ends are vulcanized and strain is further relieved by end clips. End clips are manufactured of either galvanized or stainless steel, depending on the airfoil cover material.

Two airfoil cover halves surround the flexible cell with end clips to form the airfoil assembly. The airfoil cover material is either aluminum or stainless steel, depending on the requirements for corrosion resistance. Airfoil covers are tempered to provide the desired spring coefficient. Airfoils come in standard lengths of 6, 8, 10, 12, 14, 16, 18, 20, 24, and 36 inches.

Fig. A **The Aerodynamic PRD**



Airfoils are assembled in a constructed case manufactured in galvanized or stainless steel. Airfoils are placed inside the airfoil supports in one inch increments across the height of the valve body. Airfoils may be stacked from 4 to 16 inches high.

The manifold end panel is attached with six bolts to allow removal in the field in the unlikely event of an airfoil assembly failure. Tube ends protrude through the manifold end panel and are connected together by an external manifold. Airfoils can be removed without removing the valve body from the duct. Side seals are provided at both the manifold and far end panels to provide a seal at the end of the airfoils. This seal accounts for the low discharge leakage associated with a fully closed valve.

The valve case is a standard seven inches in depth and incorporates a one inch flange around the perimeter of the case. Mounting holes are provided for convenience every two inches along the flange. Valves are available in heights of 4, 6, 8, 10, 12, 14, and 16 inches, and widths of 6, 8, 10, 12, 14, 16, 18, 20, 24, and 36 inches.

Airflow Patterns Through PRD, Venturi Valve and Blade Damper

The **PRD** is inherently a normally open device. With no control air pressure on the flexible cell, the actuator and airfoil cover are relaxed and the airfoil is essentially flat. Air flows through the valve at the maximum flow rate with minimum pressure loss. (**Fig. B** shows **PRD** with relaxed airfoils and laminar airflow).

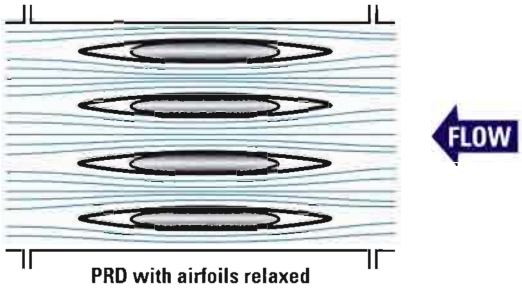
As control air pressure is increased, the airfoils expand, reducing the gap between the airfoils, and the airflow is reduced accordingly. The expansion of the airfoils minimizes turbulence and generated noise, while increasing static pressure regain. (**Fig. C** shows **PRD** with partially expanded airfoils). Furthermore, because the airfoils expand uniformly, the airflow profile across the face of the valve remains even. This is important when flow sensors are mounted upstream of the air valve.

With a control pressure signal of approximately 10 psi, the space between the airfoils closes completely and flow drops to the leakage rate of approximately 1% of the rated volume of the valve sized for 2000 feet per minute face velocity.

Figure D depicts the many linkages and moving parts in the airstream of a Venturi Valve. The spring and cone assembly creates an airflow blockage with resultant air turbulents and increased sound levels. The fact that the Venturi Valve requires higher static pressures to operate at design parameters further exacerbates sound levels.

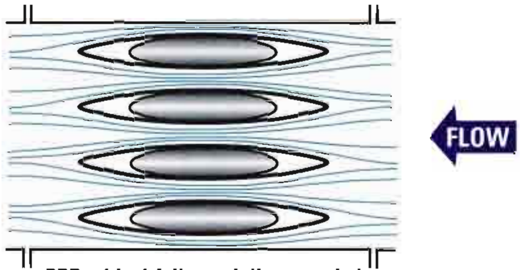
Figure E demonstrates similar turbulent airflow characteristics as air moves through a standard Blade Damper device. The Blade Damper has fewer moving parts and mechanical linkages to operate than a Venturi Valve, but operating performance accuracies are typically reduced.

Fig. B



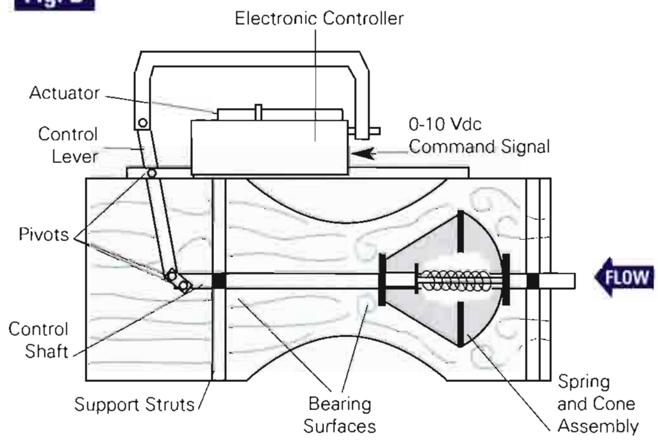
PRD with airfoils relaxed

Fig. C



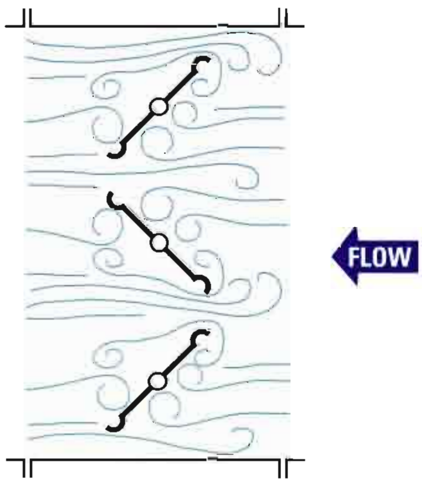
PRD with airfoils partially expanded

Fig. D



Venturi Valve

Fig. E



Blade Damper with blades partially closed

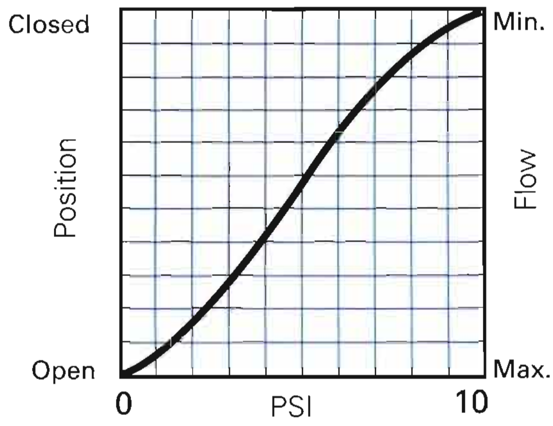
In the typical **PRD** valve, modulation of airflow volume is linear with the control pressure. This is in contrast to the nonlinear performance of conventional Blade Dampers and Venturi Valves. (**Fig. F** shows curves for **PRD**, Blade Damper and Venturi Valves).

The linear modulation of the **PRD** valve provides greater control stability and ease of programming. This is because there is no response lag to change of flow, and proportional change of flow can be expected with the **PRD**.

Fig. F

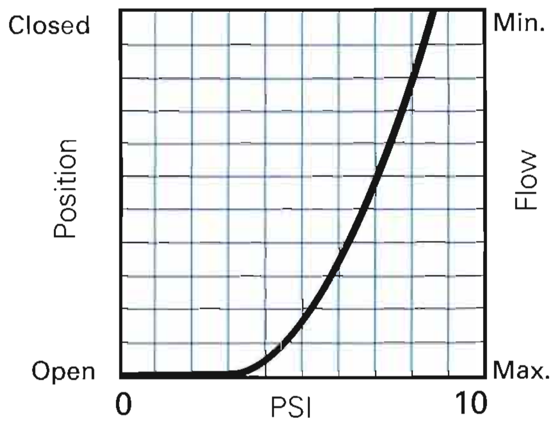
Signal/Flow Response

PRD



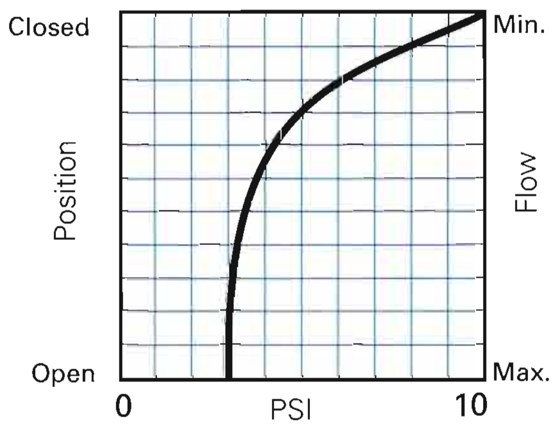
Immediate and linear operational flow control response

Blade Damper



Response lag and non-linear operational flow control

Venturi



Non-linear operational flow control

Air Valve Comparison

CHARACTERISTIC	PRD	VENTURI	BLADE DAMPER
Linearity	Linear affect to air flow.	Non linear affect to air flow.	Non linear affect to air flow.
Possibility of Sticking	Airflow flexible cell operation not affected by buildup, or if valve body is racked.	Spring/cone assembly may bind if case is racked, or with build up on bearing surfaces.	Possibility of sticking damper may bind if case is racked, or with build up on bearing surfaces.
Airflow Signal	Airflow signal provided by separate flow probe for true flow control by measurement.	Airflow signal generated by valve position only and not a true flow measurement for control.	Air flow signal provided by separate flow probe for true flow control by measurement.
Mechanical Complexity	Repositioned by pneumatic signal directly to airfoil flexible cell without mechanical linkages.	Repositioned by external actuator via linkages outside and inside damper assembly.	Repositioned by external actuator via linkages outside and inside on larger damper assemblies.
Pressure Loss	PRD's airfoil assembly does not create excessive turbulence, resulting in very low pressure drop across valve assembly.	Venturi valve requires a higher minimum static pressure to function, hence a higher pressure drop across Venturi.	Blade damper profile creates airflow turbulence contributing to higher pressure drops across damper.
Static Pressure Limitations	High static pressure fluctuations in system do not affect force to reposition airfoil's flexible cells or permanently damage assembly.	Static pressures that are higher or lower than Venturi's limits will prevent the valve from operating as a flow controller and spring failure may occur in high pressure conditions.	High static pressures require more force to reposition the damper and can permanently damage assembly by bending damper blades on large assemblies.
Longevity of Assembly	10 YEAR WARRANTY • Simple, proven, pneumatic assembly without linkages to wear out. 30+ years of proven installed reliability.	Linkages and bearing surfaces deteriorate in time which causes hysteresis and potential for noisy operation once installed.	Linkages and bearing surfaces deteriorate in time which causes hysteresis.
Maintenance	PRD can be maintained in place by integral access panels in valve assembly with components that are available from the factory.	Removal from the duct to repair / replace. No user maintainable components available. Duct access doors usually specified for inspection.	Removal from the duct required for maintenance and typically not repaired in field. Duct access doors usually specified for inspection.
Calibration	None required.	Calibration required before use in VAV systems.	None required.
Static Pressure Requirements	No minimum static pressure required for operation.	0.6 in wc or more required for valve to operate.	No minimum static pressure required for operation.
Configurations	Round and rectangular sizes available to duct size.	Round valves are ganged together for larger flow requirements requiring elaborate transitions.	Round and rectangular sizes available.
Airflow Dynamics	Aerodynamic laminar flow.	Turbulent.	Turbulent.
Ease of Mounting	Transitions are almost never required.	Transitions are required for many duct sizes.	Transitions are required for many duct sizes.

Applications

PRDs can be used in almost any application where ventilation or exhaust air must be modulated. However, the following applications are examples where the superior capabilities of the **PRD** are evident. (see **Fig. G**)

Drawing A. Fume Hood Control - Fume hood exhaust air service is severe because of the presence of vapors, high moisture, accumulating particulate, and corrosive chemicals in the exhaust air. Because the maintenance of the desired face velocity is key to worker safety, the air valve must operate flawlessly without being adversely effected by these challenges.

Drawing B. Laboratory Supply, Makeup, and General Exhaust Control - The wide range of operation, low noise, and high turndown capability make **PRD** ideal for this application. Also, the large volumetric capabilities of the valves available make it advantageous for labs with large numbers of fume hoods.

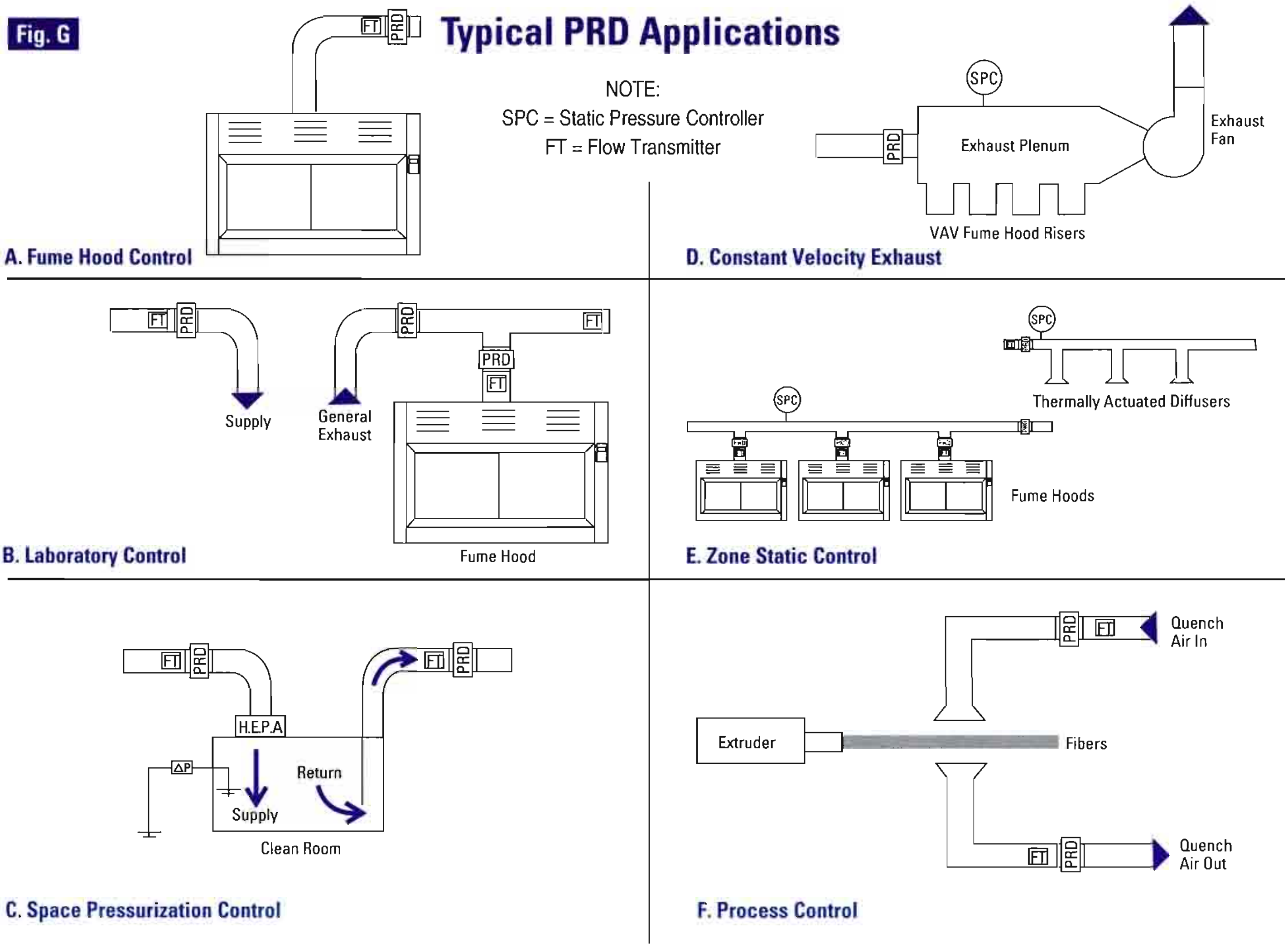
Drawing C. Space Pressurization Control - To operate properly, space pressurization control systems, often found in clean rooms, require air valves that modulate smoothly, with high turndowns, which are adjustable in very small increments.

Drawing D. Constant Velocity Exhaust Discharge - Fume hood exhaust systems must discharge into the atmosphere at sufficiently high velocities to insure that fumes are carried away from the building. When variable air volume fume hood controls are used, the volume of air from fume hoods changes and outside air is typically bled into the exhaust plenum to keep the volume of air moving through the fan constant. The ability of the **PRD** to handle pressure drops, and it's superior modulation characteristics, make it a better alternative to a Blade Damper or Venturi Valve.

Drawing E. Zone Static Control - Often large air distribution and exhaust systems serve multiple zones which may be dispersed throughout a building. These zones may experience wide variations in duct static as the volumetric demands throughout the building and the zones change. **PRD** makes an excellent choice for pressure based zone control in these applications.

Drawing F. Process Control - **PRDs** are often used in process control applications where the superior performance benefits are required. Some of these applications include tablet coating machines, quench air systems for textiles, film processing, film extrusion, and boiler control.

Fig. G



Available Options (Fig. I)

Inlet and Outlet Options - Circular to rectangular adapters are available as factory installed options to allow for the use of **PRDs** in circular ductwork.

Internal Flow Sensors For Closed Loop Control - The laminar flow profile associated with the inlet of the valve makes it an ideal location for flow sensors. Extended circular and rectangular inlet adapters are available for this purpose, and Tek-Air has designs for a variety of sensor types, including Tek-Air **TFP5000** and **VorTek** flow sensors (see **Fig. H**). In cases where extreme turbulence is expected, flow straightener material can be mounted ahead of the sensor to reduce turbulence.
*See **PRD** product sheets for factory installed flow sensor and control options.*

Control Options - A variety of valve-mounted pneumatic and electronic control options are available. Pneumatic controls provide for static pressure or volumetric control of the **PRD**. Factory installed electronic air control options for complete room management and individual fume hood control are available with all size **PRDs**. Electronic to pneumatic transducers are also available as a valve mounted option.

Manifold Options

Normally a specifically compounded nylon manifold is provided with each **PRD**. In circumstances where the valve is expected to be exposed to extreme temperatures over long periods of time, or where mechanical abrasion is expected, a copper manifold assembly is available as an option.

PRD Selection

PRDs are generally sized on the basis of volumetric airflow requirements and duct size. Valves are available in many sizes. For consistency and simplicity, all valves are 7" deep (excluding inlet/outlet neck opening). It is far better to choose the **PRD** first, then size the duct.

Rectangular Inlet Valves should be selected as follows:

Step 1 Select the appropriate square footage of valve face required to achieve the desired cfm at an appropriate valve face velocity and minimum pressure loss from **Table 2** (page 9).

Step 2 Given the area of the valve in square feet, select the valve height and width from **Table 1** (below) which most closely approximates the duct size you are adapting to and the square feet of the face area selected.

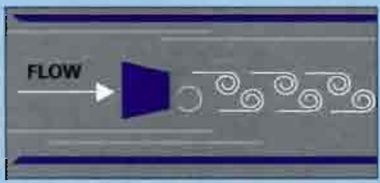
Step 3 If sound data is required, extract the generated noise data from the sound data in **Table 4** (page 10).

Valves with round inlets or outlets should be selected as follows: Using **Table 3** (page 9), determine the applicable valve size from the cfm requirements of the application.

Step 4 Integral flow sensing is utilized. Be sure to size accordingly within the operating range of the flow station.

Fig. H

Vortex Shedding



The principle of physics known as vortex shedding is the basis for Tek-Air's patented digital approach to airflow measurement. When an obstacle, such as the trapezoidal shedder in a **VorTek**™ probe, is placed in the path of the airflow, spiraling eddy currents are created. These vortices, in accordance with the laws of physics, are shed in alternating fashion from one side of the shedder to the other. Tek-Air measures the rates at which these vortices are produced, converting alternating pulses into digital signals for the precise measurement of airflow volume.

Typical examples of vortex shedding from everyday life are eddy currents around rocks in a stream or the waving motion of a flag caused by air currents around the flagpole.

Table 1
Area Calculations for Rectangular PRDs (sq. ft.)

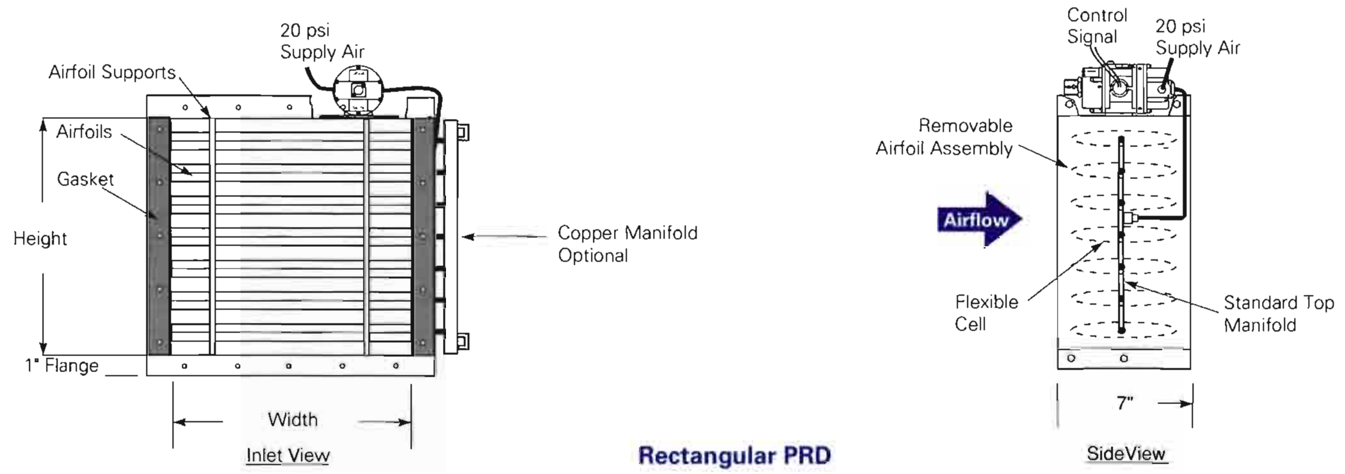
Width- Inches

Height- Inches	6	8	10	12	14	16	18	20	24	36
4	0.17	0.22	0.28	0.33	0.39	0.44	0.50	0.56	0.67	1.00
6	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.83	1.00	1.50
8	0.33	0.44	0.56	0.67	0.78	0.89	1.00	1.11	1.33	2.00
10	0.42	0.56	0.69	0.83	0.97	1.11	1.25	1.39	1.67	2.50
12	0.50	0.67	0.83	1.00	1.17	1.33	1.50	1.67	2.00	3.00
14	0.58	0.78	0.97	1.17	1.36	1.56	1.75	1.94	2.33	3.50
16	0.67	0.89	1.11	1.33	1.56	1.78	2.00	2.22	2.67	4.00

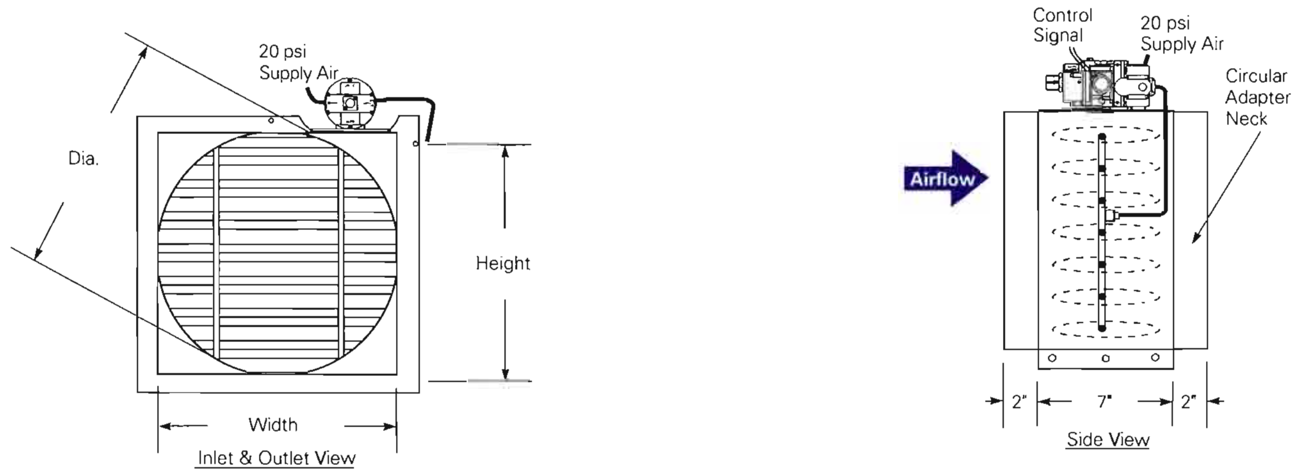
For other sizes and combinations, refer to **PRD** product sheets.

Fig. I

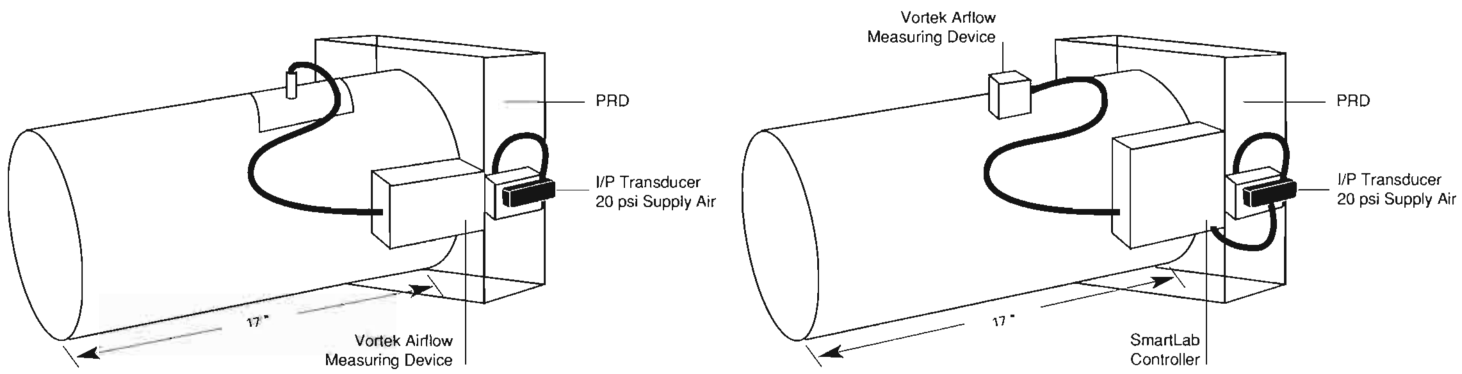
Tek-Air PRD Dimensional Drawings*



Rectangular PRD



PRD with Circular Inlet and Outlet



PRD with Integral VorTek Airflow Sensor

Refer to other **PRD product sheets for more information.*

Table 2

Rectangular PRD Selection

	Area= 0.17		Area= 0.25		Area= 0.50		Area= 0.69		Area= 1.00	
CFM	FPM	ΔP	FPM	ΔP	FPM	ΔP	FPM	ΔP	FPM	ΔP
50	-	-	-	-	-	-	-	-	-	-
75	450	0.028	-	-	-	-	-	-	-	-
100	600	0.049	-	-	-	-	-	-	-	-
150	900	0.111	600	0.049	-	-	-	-	-	-
200	1,200	0.197	800	0.088	-	-	-	-	-	-
250	1,500	0.308	1,000	0.137	500	0.029	-	-	-	-
300	1,800	0.444	1,200	0.197	600	0.042	432	0.020	-	-
350	2,100	0.604	1,400	0.268	700	0.058	504	0.027	-	-
400	2,400	0.789	1,600	0.351	800	0.075	576	0.035	-	-
500	3,000	1.233	2,000	0.548	1,000	0.118	720	0.055	500	0.023
600	-	-	2,400	0.789	1,200	0.170	864	0.079	600	0.032
700	-	-	2,800	1.074	1,400	0.231	1,008	0.107	700	0.044
800	-	-	-	-	1,600	0.302	1,152	0.140	800	0.058
900	-	-	-	-	1,800	0.382	1,296	0.178	900	0.073
1,000	-	-	-	-	2,000	0.472	1,440	0.219	1,000	0.090
1,100	-	-	-	-	2,200	0.571	1,584	0.265	1,100	0.109
1,200	-	-	-	-	2,400	0.679	1,728	0.316	1,200	0.130
1,300	-	-	-	-	2,600	0.797	1,872	0.371	1,300	0.152
1,400	-	-	-	-	2,800	0.925	2,016	0.430	1,400	0.177
1,500	-	-	-	-	3,000	1.061	2,160	0.493	1,500	0.203
1,750	-	-	-	-	-	-	2,520	0.671	1,750	0.276
2,000	-	-	-	-	-	-	2,880	0.877	2,000	0.360
2,250	-	-	-	-	-	-	-	-	2,250	0.456
2,500	-	-	-	-	-	-	-	-	2,500	0.563
2,750	-	-	-	-	-	-	-	-	2,750	0.681

	Area= 1.50		Area= 2.00		Area= 2.67		Area= 3.00		Area= 4.00	
CFM	FPM	ΔP	FPM	ΔP	FPM	ΔP	FPM	ΔP	FPM	ΔP
250	-	-	-	-	-	-	-	-	-	-
500	-	-	-	-	-	-	-	-	-	-
750	500	0.018	-	-	-	-	-	-	-	-
1,000	667	0.032	500	0.016	-	-	-	-	-	-
1,250	833	0.049	625	0.024	469	0.014	417	0.011	-	-
1,500	1,000	0.071	750	0.035	563	0.020	500	0.016	-	-
1,750	1,167	0.097	875	0.048	656	0.027	583	0.021	438	0.012
2,000	1,333	0.126	1,000	0.062	750	0.035	667	0.028	500	0.016
2,250	1,500	0.160	1,125	0.079	844	0.044	750	0.035	563	0.020
2,500	1,667	0.197	1,250	0.097	938	0.055	833	0.043	625	0.024
2,750	1,833	0.239	1,375	0.118	1,031	0.066	917	0.052	688	0.029
3,000	2,000	0.284	1,500	0.140	1,125	0.079	1,000	0.062	750	0.035
3,250	2,167	0.333	1,625	0.165	1,219	0.093	1,083	0.073	813	0.041
3,500	2,333	0.387	1,750	0.191	1,313	0.107	1,167	0.085	875	0.048
3,750	2,500	0.444	1,875	0.219	1,406	0.123	1,250	0.097	938	0.055
4,000	2,667	0.505	2,000	0.249	1,500	0.140	1,333	0.111	1,000	0.062
4,250	2,833	0.570	2,125	0.282	1,594	0.158	1,417	0.125	1,063	0.070
4,500	3,000	0.639	2,250	0.316	1,688	0.178	1,500	0.140	1,125	0.079
4,750	-	-	2,375	0.352	1,781	0.198	1,583	0.156	1,188	0.088
5,000	-	-	2,500	0.390	1,875	0.219	1,667	0.173	1,250	0.097
5,500	-	-	2,750	0.471	2,063	0.265	1,833	0.210	1,375	0.118
6,000	-	-	3,000	0.561	2,250	0.316	2,000	0.249	1,500	0.140
6,500	-	-	-	-	2,438	0.370	2,167	0.293	1,625	0.165
7,000	-	-	-	-	2,625	0.430	2,333	0.339	1,750	0.191
7,500	-	-	-	-	2,813	0.493	2,500	0.390	1,875	0.219
8,000	-	-	-	-	3,000	0.561	2,667	0.443	2,000	0.249
8,500	-	-	-	-	-	-	2,833	0.500	2,125	0.282
9,000	-	-	-	-	-	-	3,000	0.561	2,250	0.316
9,500	-	-	-	-	-	-	-	-	2,375	0.352
10,000	-	-	-	-	-	-	-	-	2,500	0.390
11,000	-	-	-	-	-	-	-	-	2,750	0.471
12,000	-	-	-	-	-	-	-	-	3,000	0.561

Table 3

Round Inlet PRD Selection

	Dia.= 4 Valve= 6"x4" Area= 0.09		Dia.= 5 Valve= 6"x6" Area= 0.14		Dia.= 6 Valve= 6"x6" Area= 0.20		Dia.= 7 Valve= 8"x8" Area= 0.27		Dia.= 8 Valve= 8"x8" Area= 0.35	
CFM	FPM	ΔP	FPM	ΔP	FPM	ΔP	FPM	ΔP	FPM	ΔP
50	573	0.012	-	-	-	-	-	-	-	-
75	860	0.028	550	0.012	-	-	-	-	-	-
100	1,146	0.049	734	0.022	510	0.022	-	-	-	-
150	1,720	0.111	1,101	0.049	764	0.049	562	0.014	430	0.014
200	2,293	0.197	1,468	0.088	1,019	0.088	749	0.025	573	0.025
250	2,866	0.308	1,834	0.137	1,274	0.137	936	0.039	717	0.039
300	3,439	0.444	2,201	0.197	1,529	0.197	1,123	0.055	860	0.055
350	-	-	2,568	0.268	1,783	0.268	1,310	0.076	1,003	0.076
400	-	-	2,935	0.351	2,038	0.351	1,497	0.099	1,146	0.099
500	-	-	-	-	2,548	0.548	1,872	0.154	1,433	0.154
600	-	-	-	-	3,057	0.789	2,246	0.222	1,720	0.222
700	-	-	-	-	-	-	2,621	0.302	2,006	0.302
800	-	-	-	-	-	-	2,995	0.395	2,293	0.395
900	-	-	-	-	-	-	3,369	0.499	2,580	0.499
1,000	-	-	-	-	-	-	-	-	2,866	0.617
1,100	-	-	-	-	-	-	-	-	3,153	0.746
1,200	-	-	-	-	-	-	-	-	3,439	0.888
1,300	-	-	-	-	-	-	-	-	-	-
1,400	-	-	-	-	-	-	-	-	-	-
1,500	-	-	-	-	-	-	-	-	-	-

	Dia.= 9 Valve= 10"x10" Area= 0.44		Dia.= 10 Valve= 10"x10" Area= 0.55		Dia.= 12 Valve= 12"x12" Area= 0.79		Dia.= 14 Valve= 14"x14" Area= 1.07		Dia.= 16 Valve= 16"x16" Area= 1.40	
CFM	FPM	ΔP	FPM	ΔP	FPM	ΔP	FPM	ΔP	FPM	ΔP
50	-	-	-	-	-	-	-	-	-	-
75	-	-	-	-	-	-	-	-	-	-
100	-	-	-	-	-	-	-	-	-	-
150	-	-	-	-	-	-	-	-	-	-
200	453	0.009	-	-	-	-	-	-	-	-
250	566	0.014	459	0.014	-	-	-	-	-	-
300	679	0.020	550	0.020	-	-	-	-	-	-
350	793	0.027	642	0.027	446	0.011	-	-	-	-
400	906	0.035	734	0.035	510	0.014	-	-	-	-
500	1,132	0.055	917	0.055	637	0.023	468	0.010	-	-
600	1,359	0.079	1,101	0.079	764	0.032	562	0.015	430	0.007
700	1,585	0.107	1,284	0.107	892	0.044	655	0.020	502	0.010
800	1,812	0.140	1,468	0.140	1,019	0.058	749	0.026	573	0.013
900	2,038	0.178	1,651	0.178	1,146	0.073	842	0.033	645	0.016
1,000	2,265	0.219	1,834	0.219	1,274	0.090	936	0.041	717	0.020
1,100	2,491	0.265	2,018	0.265	1,401	0.109	1,030	0.049	788	0.024
1,200	2,718	0.316	2,201	0.316	1,529	0.130	1,123	0.059	860	0.029
1,300	2,944	0.371	2,385	0.371	1,656	0.152	1,217	0.069	932	0.034
1,400	3,171	0.430	2,568	0.430	1,783	0.177	1,310	0.080	1,003	0.039
1,500	3,397	0.493	2,752	0.493	1,911	0.203	1,404	0.092	1,075	0.045
1,750	-	-	3,210	0.671	2,229	0.276	1,638	0.125	1,254	0.061
2,000	-	-	-	-	2,548	0.360	1,872	0.163	1,433	0.080
2,250	-	-	-	-	2,866	0.456	2,106	0.207	1,612	0.101
2,500	-	-	-	-	3,185	0.563	2,340	0.255	1,791	0.125
2,750	-	-	-	-	-	-	2,574	0.309	1,971	0.151
3,000	-	-	-	-	-	-	2,808	0.368	2,150	0.179
3,500	-	-	-	-	-	-	3,276	0.500	2,508	0.244
4,000	-	-	-	-	-	-	-	-	2,866	0.319
4,500	-	-	-	-	-	-	-	-	3,225	0.403
5,000	-	-	-	-	-	-	-	-	-	-

Table 4

PRD Generated Sound For Rectangular Inlet Valves

PRD Size: 36"x16"
Area: 4.00

		GENERATED NOISE								
CFM	Δ Press.	63	125	250	500	1000	2000	4000	8000	NC
2000	0.00	58	39	<30	<30	<30	<30	<30	37	<30
	0.52	60	57	55	60	62	54	48	40	52
	1.02	61	62	60	62	64	58	52	44	53
	2.47	63	67	67	70	70	68	59	52	58
4000	0.005	59	49	46	46	40	35	31	37	31
	0.56	61	63	60	65	68	61	54	43	57
	1.06	63	67	66	69	73	69	61	51	62
	2.52	67	73	74	78	80	78	72	66	68
6000	0.13	58	52	54	56	54	49	44	38	43
	0.63	65	67	65	68	70	66	59	50	59
	1.13	67	72	70	73	76	73	65	57	65
	2.63	70	77	77	81	83	83	75	67	74
8000	0.24	61	58	59	63	61	57	52	44	50
	0.71	67	70	68	71	72	68	62	54	61
	1.26	71	75	73	76	79	76	69	61	68
	2.7	74	80	80	84	86	85	78	70	75
12000	0.54	70	67	69	72	72	68	63	57	61
	1.02	74	74	73	75	77	74	69	62	66
	1.58	78	80	78	80	82	80	74	67	71
	3.04	82	86	84	87	89	88	82	74	79

PRD Size: 12"x12"
Area: 1.00

		GENERATED NOISE								
CFM	Δ Press.	63	125	250	500	1000	2000	4000	8000	NC
500	0.00	52	33	<30	<30	<30	<30	<30	31	<30
	0.52	54	51	49	54	56	48	42	34	45
	1.02	55	56	54	56	58	52	46	38	47
	2.47	57	61	61	64	64	62	53	46	54
1000	0.005	53	43	40	40	34	<30	<30	31	<30
	0.56	55	57	54	59	62	55	48	37	51
	1.06	57	61	60	63	67	63	55	45	56
	2.52	61	67	68	72	74	72	66	60	63
1500	0.13	52	46	48	50	48	43	38	32	37
	0.63	59	61	59	62	64	60	53	44	54
	1.13	61	66	64	67	70	67	59	51	59
	2.63	64	71	71	75	77	77	69	61	67
2000	0.24	55	52	53	57	55	51	46	38	44
	0.71	61	64	62	65	66	62	56	48	55
	1.26	65	69	67	70	73	70	63	55	62
	2.7	68	74	74	78	80	79	72	64	69
3000	0.54	64	61	63	66	66	62	57	51	55
	1.02	68	68	67	69	71	68	63	56	60
	1.58	72	74	72	74	76	74	68	61	65
	3.04	76	80	78	81	83	82	76	68	72

Measurement in sound power level.

NC index equals the number on the NC curve not exceeded with 10dB attenuation.

PRD Size: 24"x12"
Area: 2.00

		GENERATED NOISE								
CFM	Δ Press.	63	125	250	500	1000	2000	4000	8000	NC
1000	0.00	55	36	<30	<30	<30	<30	<30	34	<30
	0.52	57	54	52	57	59	51	45	37	48
	1.02	58	59	57	59	61	55	49	41	50
	2.47	60	64	64	67	67	65	56	49	56
2000	0.005	56	46	43	43	37	32	<30	34	<30
	0.56	58	60	57	62	65	58	51	40	54
	1.06	60	64	63	66	70	66	58	48	59
	2.52	64	70	71	75	77	75	69	63	66
3000	0.13	55	49	51	53	51	46	41	35	40
	0.63	62	64	62	65	67	63	56	47	56
	1.13	64	69	67	70	73	70	62	54	62
	2.63	67	74	74	78	80	80	72	64	70
4000	0.24	58	55	56	60	58	54	49	41	47
	0.71	64	67	65	68	69	65	59	51	58
	1.26	68	72	70	73	76	73	66	58	65
	2.7	71	77	77	81	83	82	75	67	72
6000	0.54	67	64	66	69	69	65	60	54	58
	1.02	71	71	70	72	74	71	66	59	63
	1.58	75	77	75	77	79	77	71	64	68
	3.04	79	83	81	84	86	85	79	71	75

PRD Size: 12"x06"
Area: 0.50

		GENERATED NOISE								
CFM	Δ Press.	63	125	250	500	1000	2000	4000	8000	NC
250	0.00	49	<30	<30	<30	<30	<30	<30	<30	<30
	0.52	51	48	46	51	53	45	39	31	42
	1.02	52	53	51	53	55	49	43	35	44
	2.47	54	58	58	61	61	59	50	43	50
500	0.005	50	40	37	37	31	<30	<30	<30	<30
	0.56	52	54	51	56	59	52	45	34	48
	1.06	54	58	57	60	64	60	52	42	53
	2.52	58	64	65	69	71	69	63	57	60
750	0.13	49	43	45	47	45	40	35	<30	34
	0.63	56	58	56	59	61	57	50	41	50
	1.13	58	63	61	64	67	64	56	48	56
	2.63	61	68	68	72	74	74	66	58	65
1000	0.24	52	49	50	54	52	48	43	35	41
	0.71	58	61	59	62	63	59	53	45	52
	1.26	62	66	64	67	70	67	60	52	59
	2.7	65	71	71	75	77	76	69	61	67
1500	0.54	61	58	60	63	63	59	54	48	52
	1.02	65	65	64	66	68	65	60	53	57
	1.58	69	71	69	71	73	71	65	58	62
	3.04	73	77	75	78	80	79	73	65	69

PRD Size: 06"x06"
Area: 0.25

		GENERATED NOISE								
CFM	Δ Press.	63	125	250	500	1000	2000	4000	8000	NC
125	0.00	46	<30	<30	<30	<30	<30	<30	<30	<30
	0.52	48	45	43	48	50	42	36	<30	38
	1.02	49	50	48	50	52	46	40	32	41
	2.47	51	55	55	58	58	56	47	40	47
250	0.005	47	37	34	34	<30	<30	<30	<30	<30
	0.56	49	51	48	53	56	49	42	31	45
	1.06	51	55	54	57	61	57	49	39	50
	2.52	55	61	62	66	68	66	60	54	57
375	0.13	46	40	42	44	42	37	32	<30	31
	0.63	53	55	53	56	58	54	47	38	47
	1.13	55	60	58	61	64	61	53	45	53
	2.63	58	65	65	69	71	71	63	55	62
500	0.24	49	46	47	51	49	45	40	32	38
	0.71	55	58	56	59	60	56	50	42	49
	1.26	59	63	61	64	67	64	57	49	56
	2.7	62	68	68	72	74	73	66	58	64
750	0.54	58	55	57	60	60	56	51	45	49
	1.02	62	62	61	63	65	62	57	50	54
	1.58	66	68	66	68	70	68	62	55	58
	3.04	70	74	72	75	77	76	70	62	66

Guide Specification

Furnish, where indicated on the plans, for installation in the ductwork by the sheet metal contractor, airflow control valves of the flexible cell type. Valves shall be pneumatically operated over the input range of 1 to 13 psi. Individual valves shall be available in sizes ranging from 0.15 to 4.0 square feet. Larger valves shall be fabricated by combining individual valves. Valve manufacturer must demonstrate a proven service life of 25 years in similar applications.

Airflow control valves shall consist of the following components:

- A heavy gauge casing manufactured of galvanized steel (or stainless steel where required), with a removable side panel for airfoil access without requiring valve removal from the duct.
- Expandable pneumatic flexible cells manufactured of EPDM rubber, tested in accordance with ASTM standards and capable of operating at temperatures as high as 250 degrees F.
- Airfoils manufactured of tempered aluminum (or stainless steel), with a thickness of at least .032 inches.
- An air distribution manifold manufactured of virgin material and designed to withstand pressures of at least 30 psig. Manifold shall be supported by a strain relief bracket and terminated in a brass, 1/4 inch barbed fitting.

Air valve operation shall be such that supplemental actuation motors and linkages are not required. The airflow control valve shall not have a dead-band at any point in the operational range. Air valves shall exhibit linear modulation of airflow and shall provide a minimum of a fifty to one turndown on flow. Leakage through a closed valve shall not exceed 3% of a rated flow volume at 2000 fpm face velocity. Casing leakage shall be less than 1% of the rated flow at 4 inches of static pressure.

Valves for ducts less than one square foot in area shall not have a pressure loss greater than 0.3 inches at 1500 fpm face velocity. Valves for ducts greater than one square foot shall not have a pressure loss greater than 0.3 inches of water at 2000 fpm face velocity.

Valves shall withstand a continuous control pressure of up to 20 psi and temporary overpressure to 35 psi. Valves shall be capable of withstanding control pressure of up to 50 psi without bursting. Valves shall be able to withstand 100% relative humidity and particulate coatings up to 5 mils without a detrimental effect on performance.

Vortex Shedding Flow Sensor Option

Where specified, valves are to be provided with factory installed vortex shedding flow sensors and an electronic transmitter. Transmitters shall operate on either 20-28 VAC or 15-20 VDC power and shall output a 4-20mA or 2-10 VDC signal linear and proportional to the flow volume. Transmitter accuracy shall be plus or minus 3% of reading over the operation range. Flow sensors shall indicate actual cfm and shall not be effected by particulate, moisture, temperature, or ambient pressure. Flow sensors are to be wind tunnel tested.

Averaging Pitot Flow Sensor Option

Where specified, valves are to be provided with factory installed pitot flow sensors. Sensors shall output an amplified differential pressure signal to a transmitter which shall be supplied by others.

Electronic to Pneumatic Transducer Option

Where specified, valves are to be provided with a factory installed electronic to pneumatic transducer. The transducer shall be high volume type, capable of exhausting or inflating one square foot of valve face area in one second. The transducer shall utilize either a 4-20mA input signal, or optional 0-10 VDC signal.