Terms & Abbreviations

Air Distribution Outlet (Inlet)—A device through which air passes. Used to generally describe grilles, registers, & diffusers.

Ak—see *Effective Area*

An—see *Neck Area*

Ceiling Effect—The tendency of moving air along a surface to remain in contact with that surface. See also *Wall Effect*.

Cfm—Cubic feet per minute; a measure of air volume.

Core Area—The total plane of the portion of the outlet bounded by a line tangent to the outer opening through which air can pass. The core area is always less than the specified outlet size.

Damper—A device used to control the volume of air passing through a duct by varying the cross-sectional area of the duct.

Diffuser— An air flow device designed to discharge conditioned air in a spreading pattern, specific path, or particular direction. Used for supply air applications.

Diffusion—The process of moving supply air within a given space by means of a diffuser.

Drop—The vertical distance (in feet) between the base of an outlet and the bottom of the air stream at the end of the horizontal throw.

Effective Area—The calculated area of an air outlet based on the average measured velocity between the fins. Measured in Sq.Ft. (square feet).

Free Area—A measurement, in square inches, of the actual perpendicular area between the fins of an outlet through which air can pass.

GRD—Grilles Registers, Diffusers

Grille—A covering for an opening through which air passes. Typically used for return air applications but may be used for supply air.

Neck Area—The total area through which incoming air passes to reach an outlet. Limited by, for example, collar size or the size of the attached damper box. Measured in Sq.Ft. (square feet).

NC—see *Noise Criteria*

Noise Criteria—A single number noise rating that indicates the acceptability of continuous sounds within a space. NC is typically plotted on a curve that defines the limits that the octave band spectrum of a noise source must not exceed if a certain level of occupant acceptance is to be achieved.

Outlet—See *Air Distribution Outlet*

Outlet Velocity—The average velocity of air emerging from a supply outlet; measured in the plane of the outlet in feet per minute.

PL—see *Pressure Loss*

Pressure Loss—When used specifically for supply outlets (registers, diffusers), it describes the total pressure required to move air through the outlet. Measured in water gallons.

Ps—see *Static Pressure*

Pt—see *Total Pressure*

Pv—see *Velocity Pressure*

Register— A damper-equipped grille which supplies conditioned air.

Return Air—Air exiting a conditioned space by passing an opening.

Spread—The horizontal distance of an air pattern from an outlet. Expressed in fpm (feet per minute).

Static Pressure—The outward force of air within a duct; expressed in inches of water.

Supply Air—A description of conditioned air being delivered to a particular space.

Terminal velocity—The point at which the air discharged from an outlet reaches a predefined speed.

Throw—The distance, in feet, that an air stream travels from the air outlet to a point where the terminal velocity reaches 50 fpm (feet per minute).

Total Pressure—The sum of the air velocity pressure and static pressures; expressed in inches of water.

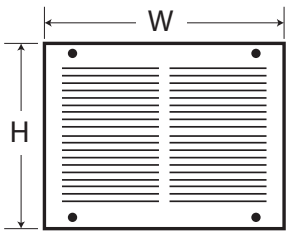
Velocity Pressure—The forward-moving force of air; measured in inches of water.

Wall Effect—The tendency of moving air along a surface to remain in contact with that surface. See also *Ceiling Effect*.

General & Design Notes

Dimensions

Product dimensions are always given as width by height (W x H). This is easy to visualize for products designed for sidewall or baseboard mounting. Here, the Width is the horizontal measure while Height is the vertical measure. For floor-mounted registers and grilles, Width is the shortest of the two dimensions.



Product Sizes

This catalog includes Performance Data for products. Such data varies by product size. However, the Performance Data does not always provide a full listing of available sizes for each product. See your authorized Continental distributor, or the Continental web site (www.continentalindustries.com) for a complete description of most commonly available sizes for each product.

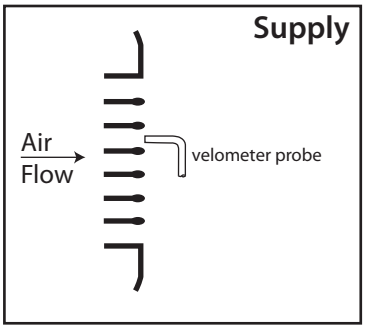
Calculating CFM for Sizes Not Listed

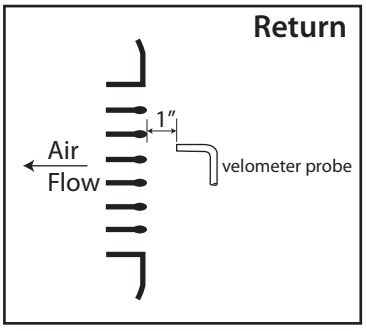
You can calculate CFM for larger and smaller sizes than those listed in this and other tables. You do so by using CFM data from a listed size and extrapolating to the desired size.

For example, if you need the value of a 32" x 20" grille, you can use the square size value of a smaller unit and multiply by the square size of the size needed. The 32" x 20" grille has an area of 640 square inches (32 multiplied by 20). In this example you can use a 16" x 20" grille, which has an area of 320 square inches (exactly half of the desired grille size). Thus, the 32" x 20" is 2 times larger. So you simply take the listed CFM for the 16" x 20" unit and multiply by 2 = 678 CFM.

System Balancing

System balancing refers to the achievement of proper air flow throughout the system (supply and return). Balancing is essential for any HVAC system to perform to plans and expectations. Terminal Velocity is a critical element and will have a major effect upon the Throw of a supply outlet. Terminal velocity is listed at the conclusion of each appropriate Performance Data table in this catalog.





Measuring Supply and Return Air

Use an air velocity meter (velometer) and jet probe. Position the probe flush to the face of the register or diffuser and centered in an opening. Guide fins on most probes provide for accurate positioning in all directions. Within a 6" x 6" area of the outlet face, obtain at least four outlet velocities. Average you readings. This will be known as "Vk" for the purposes of our calculations. Calculate Cfm as follows: Cfm = Ak x Vk

For **return air outlets**, use the same method as above but place the probe 1" from the face of the outlet. Many probes will have a position gauge to use in this circumstance.

Applying the Performance Data

After you determine the locations and styles of air outlets to be used, locate the corresponding Performance Data charts in this catalog. Select a size that delivers the required Cfm at a velocity that is recommended for your particular application or specified Throw requirement.

(continued)

Note that noise increases with increasing velocities. If the Cfm is constant, an increase in either size or number of air outlets of given size, will decrease the velocity, Throw, and related noise.

Style, Size, Placement

"The selection and placement of the supply air outlets are critical to the comfort in the space. The air must be delivered in a manner that mixes the supply air with the room air without introducing unacceptable noise or causing the sensation of a draft on the occupant. The manner in which the air is distributed in the room is the function of the shape and size of the air outlet. Placement of the air outlet is as important to the comfort in the room as is the type of air outlet that is selected." (U.S. Department of Energy, *Advanced Strategy Guideline: Air Distribution Basics and Duct Design*, p. 22)

Selecting the optimum style, size, and placement of air outlets presents a design challenge due to such factors as the type of space, its energy efficiency status, and geographic considerations.

Understanding Area Factors

Discussions of air outlets and inlets often include talk of area, as in Free Area and Effective Area. Today, these terms are often misapplied. A brief discussion of each follows.

Effective Area

As defined earlier, Effective area, also expressed as the Ak factor, calculates the area of the outlet based on measured velocities of air. In other words, it is meaningful only as it relates to actual performance of the outlet. It is not based on any physical dimensions of the product. In addition, the Ak factor is HIGHLY dependent upon the test criteria and instrumentation used.

As a convenience to customers, this catalog defines the Ak factor for virtually all listed devices. Remember, however, that this data is dependent on the testing methodology employed by Continental Industries. Other testing methods will reveal different data.

Free Area

This one is trickier. The definition of the term is easy enough. Free Area refers to daylight or the area between the outlet fins through which air can pass. But the term, Free Area, is a carry-over of older gravity-based HVAC systems (not the forced air systems commonly used today). For these older systems, Free Area was needed to ensure proper combustion activity.

You might need to know the Free Area for such older applications. **To approximate Free Area, multiply the Ak value by 144.** (Ak expressed in square feet; Free Area expressed in square inches.)

Note, however, that this is not a technically accurate method as there is no direct relationship between the calculated Ak factor and the measured Free Area. Since Free Area is used to compare between a given outlet and others within the system, better methods would include taking and comparing direct measurements, comparing static pressures, or comparing sound levels.

Noise Criteria Guidelines

General guidelines have been established as to acceptable noise levels within various interior, occupied spaces. Because air movement and distribution from the associated HVAC systems can contribute to noise levels, it is important for engineers and contractors to design systems accordingly.

The table below offers generally acceptable NC (noise criteria) ratings for various environments.

Environment	Room Type	Suggested NC
Residential	Living Areas	30
Residential	Bathrooms, Kitchens, Utility Rooms	35
Commercial	Concert halls, opera houses, broadcast, recording studios, large auditoriums, large churches and recital halls	20
Commercial	Small auditoriums, theaters, music practice rooms, large meeting rooms, teleconference rooms, executive offices, small churches and courtrooms	20 to 30
Commercial	Bedrooms, sleeping quarters, hospitals, apartments, hotels and motels	25 to 35
Commercial	Private offices, small conference rooms, classrooms and libraries	30 to 35
Commercial	Large offices, reception areas, retail shops cafeterias, restaurants and gymnasiums	35 to 40
Commercial	Lobbies, drafting and engineering rooms secretarial areas and maintenance shops	40 to 45
Commercial	Kitchens, laundry facilities and computer equipment rooms	45 to 55

A factor closely related to Noise Criteria is velocity; that is, the velocity of air exiting from supply air outlets or returning through return air outlets. The following table provides general guidelines to assist in your system design.

Noise Criteria	Air Velocity at Supply Outlet	Air Velocity at Return Air Outlet
15 to 20	250 to 300 fpm	300 to 360 fpm
20 to 25	300 to 350 fpm	360 to 420 fpm
25 to 30	350 to 425 fpm	420 to 510 fpm
30 to 35	425 to 500 fpm	510 to 600 fpm
35 to 40	500 to 575 fpm	600 to 690 fpm
40 to 45	575 to 650 fpm	690 to 780 fpm