

Basic Calculations for Fabric Duct

The basis for fabric duct calculations is dependent on an internal air flow velocity of 1,500 feet per minute (FPM) @ 0.5" Static Pressure. These two parameters determine the duct diameter. In the case of a 4,100 CFM duct, the nominal diameter is 22.4 inches. We would choose 24" diameter for the final design yielding an internal air flow velocity of 1,305 FPM.

For applications such as an auditorium or church sanctuary, we would calculate a diameter based on an air flow velocity of 1,100 feet per minute. In the case of a 4,100 CFM supply, the duct would then have a diameter of 26.1 or 26 inches in diameter with an air flow of 1,112 FPM.

Linear venting width or air jet diameter calculations depend solely on the length of the duct and the inlet Static Pressure to distribute the total CFM. A 24" diameter duct of 100 feet length @ 4,100 CFM will distribute 41 CFM per linear foot of duct. A 50 foot duct with the same CFM will distribute 82 CFM per linear foot and the total venting area will be the same as the area for the 100 foot duct!

Venting takes into consideration that fabric Elbows do NOT have vents; neither do Tees or Reducers. Sometimes, the customer may NOT want venting in certain sections of a duct run. Sometimes they may want greater CFM distributed for a particular portion of a duct run. All these factors affect the vent width(s) or air jet diameter(s). Venting calculations must take into account that the duct must be completely inflated over its entire length in order to distribute the inlet CFM UNIFORMLY over the entire duct length.

Fabric duct air distribution is likened to a leaker-type garden hose. Since the air is uniformly distributed over the duct's length, there is rarely the need for a diameter reducer to build up the static pressure. The static pressure in a fabric duct increases only slightly from the air flow entry to the end cap of the duct, e.g., from 0.5" to 0.65".