

The Total Comfort System

The air distribution aspect of air conditioning and heating systems can often be misunderstood. We all know that cool or warm air is needed in each room in order to bring that space to a comfortable condition, but to achieve this correctly takes much more than tying a duct onto an air handler and letting it blow. Before getting into the air distribution system, there are some basic concepts and terminology that must be understood to achieve a system that will deliver comfortable conditions throughout the conditioned space.

TOTAL AIR VOLUME - Cubic Feet Per Minute (CFM)

CFM refers to the total volume of air measured in cubic feet that is moved through the system in one minute. The total CFM that can be delivered through a duct is dependent on the pressure making the air move, combined with the size of the duct. Naturally the larger the duct is and the more pressure behind the air, the more air that can be moved. Normally you would expect to have a total air volume of approximately 400 CFM per ton of air conditioning moving through the air handler and duct system.

Example: 3 tons x 400 CFM per ton = 1200 CFM total for a 3-ton unit.

Each area of a building has a specific heat gain and heat loss that determines how much air will be required to heat or cool that area. Once the required CFM is determined through a load calculation, it is then distributed proportionally to each area of the structure. It is very important to make sure that the air is delivered where it will not blow directly on the customer or create noise.

VELOCITY - Feet Per Minute (FPM)

Velocity is measured in feet per minute (FPM) and indicates the speed of the air moving through a duct (similar to miles per hour). If you imagine an inspection hole in the side of a duct and a long piece of string suspended in the air stream traveling at the same speed of the air, the velocity (FPM) would be equivalent to how many feet of the string passed the inspection hole in one minute.

Noise is becoming a major factor in today's homes. The discriminating homeowner may be spending tens of thousands of dollars for a complete comfort system, and the last thing they want to do is keep adjusting the television volume when the blower cycles on or off. Excessive noise can be created by air moving through the system at a higher than designed speeds. The velocities referred to on the following pages are recommended for residential homes and are lower than that of commercial buildings. Velocities of a comfort system can be measured with a velometer or calculated by knowing CFM and size of the duct.

With a given amount of CFM moving down a duct, as the size of the duct changes, the velocity changes to the same extent. If a duct were suddenly reduced to one half its original size, the velocity would double. On the other hand if the size of the duct were doubled, the velocity would be cut in half.