

# MAKE 2019 THE YEAR YOU IMPROVE YOUR DUCT DESIGN SKILLS

David Richardson of the National Comfort Institute (NCI) wrote in his January 14, 2019 Duct Dynasty Column in the ACHRNEWS, *"Throughout history, revolutions have started for many reasons. Most often, the main reason is dissatisfaction with current conditions and a desire to see things change. The industrial revolution in our country started this way...The HVAC industry falls into this category...HVAC equipment has rapidly advanced and become sleeker, smarter, and more efficient—but systems installation hasn't followed suit. Instead, duct installations seem to be going the other way. Please understand that equipment is not the system. It's just a component of the system. A duct system that doesn't deliver the equipment's rated capacity into a building will fail to operate as designed, no matter how smart it is...Duct systems remain in the Stone Age due to outdated duct sizing rules of thumb, sizing equipment by building square footage, placing ducts in attics and crawlspaces and poor duct installation practices. These practices keep HVAC professionals from doing their best and, in many cases, unintentionally creating not-so-smart installations."*

Over my years here at Total Air Supply we have had many request for duct sizing classes but I have always held off since many do not size there ductwork based off a room-by-room Manual J load calculation but do so off rules of thumb like a given number X square footage = heat load or one of the other many different ones out there.

The reason we need to have a room-by-room Manual J is there's no rules of thumb that can accurately give you the correct heating and cooling load and airflow requirements for each room of the residence.

A Manual J load calculations takes into account a whole lot more than square footage of a building. In addition to room square footage and ceiling height it considers the construction materials, insulation values, window size and values, outside wall area, directions windows are facing, outdoor design temps for that area and indoor design temps, etc., etc.

In order to design better duct systems we first have to know how and why air flows through a duct and the things that will hinder it. We need to understand what terms such as static pressure, velocity pressure and total pressure mean, how to measure them and how they affect airflow and how quiet your duct system will be. We also need to understand the relationship between CFM (airflow rate), static pressure (resistance to airflow) and amperage (how hard the blower motor is working).

While the customer should do most of the talking while you listen and take notes, at least in the beginning, there are many questions to ask and a lot of information to be gathering during your visit. Even if you are there simply for a change out of existing equipment or to add equipment, you should do a manual J block load on the home. The reason for this is the probability of the furnace being oversized is high, undersized furnaces are rare, and you most likely will be able to downsize the unit. This will not only improve the customers comfort level because of longer run cycles that give the air much better circulation, getting rid of the hot and cold spots caused by air stratification, it will also help with potential undersize ductwork. After this segment you will fully understand why replacing equipment with the same size unit without doing a load calculation is the same as guessing.

Another skill many technicians lack is how to correctly use a duct calculator, aka, a ductulator. Setting the duct calculator at .10 friction rate and sizing your ducts is a recipe for undersized ductwork. Many other factors have to be accounted for to properly size ductwork using the equal friction method.

Next you need to know the dos and don'ts of ductwork and duct fittings. Once you understand what pressure drop, available static pressure, equivalent and effective length mean, you will quickly see how they guide your choices in duct fittings, Evaporator coils, filters and your friction rate calculations.

Finally, you will need to apply all of the knowledge mentioned above when doing your ACCA Manual D Friction Rate and Duct Sizing worksheets.

This is a general outline of things you need to know to correctly size ductwork for today's high efficiency heating and cooling equipment but you can rest assured it's real easy to turn high efficiency equipment into low efficiency, poorly performing equipment that doesn't give the consumer the comfort or energy efficiency they paid for simply by connecting it to an undersized or poorly performing duct system.

If you would like to learn more about duct sizing and how it can help you on retrofits as well as new installations, consider taking our NEW "Do and Don'ts of Correctly Sizing Ducts" class. Check out Total Air Supply's [Spring Training Schedule](#) for more information.

If you would like to read the full January 14, 2019, Duct Dynasty column by David Richardson, [click here](#).