

Proper Design Makes for a Proper System

A zoning system is an excellent way to increase comfort in the home.

INTERVIEWED BY PETE GRASSO

Before designing and installing a zoning system in a home, an important first step is to determine if the HVACR system is sized correctly for the home and if the ducts are correctly sized to handle the volume of air delivered.

Glenn Hourahan, senior vice president for research & technology at the Air Conditioning Contractors of America (ACCA) says too often these basics are overlooked and zoning isn't effective because the home's HVACR system wasn't working properly from the start. This was among the findings from a study done in California by the Air-Conditioning, Heating and Refrigeration Institute's (AHRI's) Zoning Section Committee.

"Using forced air zoning is a great way to increase the comfort in a home," Hourahan says. But, he warns, zoning is not a solution to problems that already exist due to poorly selected or installed HVACR systems.

Once you've determined that the system is working properly, you can use ANSI/ACCA 11 Manual Zr (Residential Zoning) to properly design and install a zoning system to provide for enhanced occupant comfort. *HVACR Business* spoke with Hourahan about the advantages of by-pass dampers in forced air zoning and the positive attributes of ACCA Manual Zr.

How are bypass dampers used?

In a constant volume, forced air zoning system, as the zones start shutting down, you wind up with excess air. Where is all of the excess air going to go?

Without a purposeful design and quality installation plan, the excess air is going to be forced into the zones that are still open; generating drafts, and objectionable noise caused by the high airflow velocities through the ducts and the outlet grilles. Manual Zr provides a number of engineered approaches for handling excess air. These approaches include allowing a bit of

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engineered 'overblow' into the open zones (30 percent maximum), allowing a bit of engineered 'distributed relief' into the closed zones (15 percent maximum), as well as 'bypass' where a portion of the supply air is routed back to the return-side of the HVACR equipment. Generally, multiple approaches need to be used to handle the excess air in that no one strategy can handle all of the possible excess air scenarios.

What's the biggest misconception of bypassing air?

Often, contractors try to bypass too much air. Manual Zr details that there's a maximum percentage of air you can bypass. In the cooling season, cold air comes off the coil and gets ready to go out to the rooms ... if you bypass too much of it, you wind up bringing back too much of the cold, conditioned air to the air conditioning coil where it gets chilled even more. If this excess amount of colder and colder air continues to bypass back, the coil can freeze. The same thing can happen with a furnace. If too much hot air is bypassed back into the entry of the furnace it will get hotter, it can even go off on a high temperature safety limit.

When properly designed and setup, bypass is a great solution, but you need to limit how much CFM can be routed back to the unit. The amount of allowable bypass air is dependent on factors, such as the outdoor air temperature, the OEM's low limit temperature (for cooling), the blower CFM per ton (for cooling), the OEM's high temperature limit (for heating), and the way the heat is staged.

How has Manual Zr helped promote correct zoning installations?

Manual Zr is a nationally recognized standard. It's a design manual used for identifying rooms that can be zoned together and how to set up a zoning system; including designing and setting up the bypass linkage. Manual Zr is supportive of the correct form of zoning through several methods: multiple pieces of equipment, a ductless or radiant system, and via the use of zone dampers. A good part of Manual Zr addresses zoning via zone dampers, because it's a cost effective way to add zoning.

What was the biggest takeaway from the AHRI Study done in California on zoning a home using Manual Zr methods?

Zoning can't fix problems that are already in the house. If there are leaky, under-sized ducts, the equipment is not properly sized or if the system hasn't been maintained and the coils are dirty, simply putting zone dampers in the house isn't going to fix the problem. The California study looked at why there were problems with zone dampers on some homes, and found out the underlying HVACR systems weren't working properly to begin with ... the inefficiencies had little to do with the zone dampers. It was caused by the poorly designed and installed HVACR systems. Furthermore, the study showed that when a zone damper system with a bypass linkage is installed per the instructions in Manual Zr, thereby limiting the bypass volume to a specific volume, that overall HVACR system energy efficiency was maintained. ♦