

Commercial Range Hoods Installed in a Residence

A commercial range hood as defined by the Florida building code is a hood capable of removing greater than 400 cfm of air from the residence. A typical 2500 square foot home has a natural building leakage rate of about 100 cfm, so range hoods with cfm values greater than 100 cfm will fall short of functioning properly because the range hood can only remove the amount of air that the building leaks, unless of course you open a window to increase the building leakage rate to match the range hoods ability. Opening a window is undesirable in our region due to the high heat and moisture associated with outdoor air - leading to discomfort, high energy costs, and possible building deterioration. Current codes require mechanically controlled "make up air" for range hoods that remove more than 400 cfm. This is accomplished by adding a make up air duct + motorized damper that interlocks with the range hood, this make up air duct damper will open when the range hood is activated allowing outdoor air to be introduced into the residence. This make up air must be delivered directly to the range hood itself to avoid discomfort elsewhere in the residence – delivering this make up air anywhere other than the range hood face will add a significant heat and moisture load to the residence itself.

A common example is a 1000 cfm range hood (10" exhaust duct) selected by the home owner for use in a residence – using the 2500 square foot home with a 10 foot ceiling as an example, a hood this size is capable of removing all the interior conditioned air in less than ½ hour of cooking time if the make up air is not delivered directly to the range hood face! By delivering this hot moist make up air directly to the range hood face, the negative pressure in the building is held to that location only, with little effect on the conditioned air elsewhere in the building – this is the correct approach and is used on every commercial building containing a range hood – so you can see why our building codes classify range hoods over 400 cfm as commercial applications. Another common mistake made by hvac contractors in our area is to introduce this make up air into the homes return air plenum (or any other location in the building other than the range hood face) instead of the range hoods face. When make up air is not introduced at the range hood face itself, the make up air energy penalty must be added to the heat load calculations – this will increase the amount of air conditioning tons required to condition the building during cooking events – and if the cooking duration is 1 hour or greater – the amount of air conditioning is significant because in effect your hood is removing all the good conditioned air (big energy cost) instead of removing just the make up air! Commercial range hoods always introduce the make up air directly to the hood face to avoid this energy penalty and discomfort elsewhere in the building, and in fact commercial range hoods use both an exhaust fan and a make up air fan intrinsic to the range hood.

Below is the energy penalty associated with introduction of make up air directly into a residence (return plenum or elsewhere) instead of introducing the make up air directly at the hood face. The initial cost and energy penalty associated is significant to say the least, as it would take an additional 10.5 tons (per hour) of air conditioning when this make up air is introduced improperly!

Subtotals for structure:		0	0	0	0
People:	0		0	0	0
Equipment:			0	0	0
Lighting:	0			0	0
Ductwork:		0	0	0	0
Infiltration: Winter CFM: 0, Summer CFM: 0		0	0	0	0
Ventilation: Winter CFM: 1,000, Summer CFM: 1,000		35,176	31,511	17,588	49,099
Total Building Load Totals:		35,176	31,511	17,588	49,099
Check Figures					
Total Building Supply CFM:	0		CFM Per Square ft.:		0.000
Square ft. of Room Area:	2,500		Square ft. Per Ton:		238
Volume (ft ³) of Cond. Space:	25,000				
Building Loads					
Total Heating Required Including Ventilation Air:	35,176 Btuh		35,176 MBH		
Total Sensible Gain:	17,588 Btuh		36 %		
Total Latent Gain:	31,511 Btuh		64 %		
Total Cooling Required Including Ventilation Air:	49,099 Btuh		10.50 Tons (Based On 75% Sensible Capacity)		
Notes					