Good News From the Doctor

Short Circuit Hoods - Relative Humidity - Raindrops & Lard

Not too long ago, a contractor called and asked us why his new "Brand X" (not Greenheck) kitchen exhaust hood was sweating. He had purchased a short circuit hood that brought in untempered make-up air. Here was our response:

Visible condensation will occur when a surface temperature is below the room air dew point. In this case, when the relative humidity in the kitchen is high enough and the outside air is cold enough, water droplets will form on the cold metal surface of the kitchen hood. An example would be:

Room Temperature	Percentage of RH in Kitchen	Outside Air Temperature (or Colder)
70º F	10%	12º F
70º F	20%	28º F
70º F	30%	37º F
70º F	40%	45º F
70º F	50%	59º F

or, for example, if the relative humidity in the kitchen is 30% and the outside air temperature is 37º F (or colder), then condensation will occur on the cold surfaces of the hood.

The solution is either:

1. Shut off the make-up air and pull the cold make-up air in the front door, through the building and across the occupants (similar to what you find in most restaurants) and finally in to the kitchen area. The air will warm up as it passes over customers, their food and the employees before it gets to the kitchen . . . . . , or

2. Seal off the "short circuit baffles", cut in supply registers to allow the make-up air unit to be introduced into the kitchen, and add 80 BTU/hr (23 watts electrical) per CFM of air being heated, i.e., 80,000 BTU/hr or 23 KW per 1,000 CFM of outside air.

As you know, animal fat (the vaporous byproduct of frying meat) congeals at room temperature (70º F) and this process accelerates as the temperature is lowered. When you "short circuit" cold air directly into the "grease" filters, they become "lard accumulators". This is one of the benefits of a short circuit hood --- a built-in lard trap. Because the animal fat congeals on surfaces like filters and ducts, it does not run down and

drain as required in mechanical code books. This condition is a fire hazard.

Imagine this for a moment - exhaust fan exhausting 3,000 CFM with an outside air make-up air fan short circuiting 2,500 CFM - this only leaves 500 CFM of exhaust air to capture cooking vapors rising up from the cooking surfaces.

If all you need to capture from the cooking process is 500 CFM, then scrap the make-up air unit and slow the exhaust fan down to 500 CFM.

If all you're doing is chopping lettuce and warming potatoes, then 500 CFM is probably OK; however, if you're preparing meals for several hundred people, an analysis of the cooking appliances (type and size) will determine the contaminated air quantity rising up from these surfaces. Refer to Greenheck's design manual for proper air flow design. You need to be exhausting properly calculated volumes and introducing treated make-up air into the kitchen area.

Although the BOCA National Mechanical code does not specifically prohibit "short circuit" hoods, the Commonwealth of Kentucky strongly discourages them and prefers that they not be installed in Kentucky. The BOCA code does require that:

M-504.5.2 Make-up Air: Make-up air shall be supplied during the operation of the kitchen exhaust system. The amount of make-up air shall be approximately equal to the amount of exhaust air. The make-up air shall not reduce the effectiveness of the exhaust system.

The temperature differential between make-up air and air in the conditioned space shall not exceed 10º F. (5.5º C.).

Exceptions

1. Make-up air that is part of the air conditioning system.
2. Make-up air that does not decrease the comfort conditions of the occupied space.

The Indiana Mechanical code states:

". . . . . Compensating hoods shall extract at least fifty percent (50%) of the required air flow from the kitchen area."

and that:

". . . . . The make-up air shall not reduce the temperature of the occupied space to less than sixty-five degrees Fahrenheit (65º F) at five (5) feet above the floor throughout the room."

In summary, properly designed kitchen exhaust systems should have the following elements:

A. Supply and exhaust CFM calculations based on the equipment under the hood.

B. Tempered supply (make-up air) introduced into the room, not untreated, new air supplied under the hood.

For additional design/equipment selection information, please contact one of our sales associates.

Always remember . . . . . .

(1) part empherical formula + (2) parts horse sense =

"good design techniques"

Doc

"Good news from the Doctor" is an occasionally written letter based on "Bad News" experiences we have encountered while trying to earn the groceries. This letter is intended to make you aware of certain pitfalls we have already enjoyed and recommend that you perform your own research and draw your own conclusions so you won't blame us if it doesn't work! Be aware that your school days education is the cheapest education you'll ever get!