A restaurant has an exhaust fan that is designed to pull 2,300 CFM of air of the kitchen. It has a dedicated outdoor makeup air system that brings in 2,300 CFM. If you wanted to make the kitchen positively pressurized what would need to happen?

The kitchen exhaust hood could be slowed down so it pulled out less air. However, it may not meet the code airflow requirements.

The dedicated outside air system could be adjusted so it will bring in more outside air if the unit sizing will allow for the increase and still properly heat and cool the entering air.

Air could be brought in from the dining area if it is operating at a higher pressure than the kitchen. Again Codes must be followed. For example, in the location where Maria’s restaurant was located the air transferred would need to be filtered.

Kitchen odors are coming into the dining area when the waiters open the doors to the kitchen. The owner states this never used to happen. What could be the cause for this change in pressure?

The number one cause to check would be the dining area HVAC system outside air minimum position. If it was closed off or stuck closed, the dining area would lose its positive pressurization.

The number two thing to check would be the makeup air fan or pathway for the kitchen hood. It could be as simple as dirty filters.

It could be something else, like a prevailing wind into the back kitchen loading area door that is being left open.

It could be a combination of all of the above. When checking a system check all of the components!

Looking at the picture of the economizer, what would happen if everything was operating properly except the Return air damper became stuck ½ open?

When the economizer outside air and relief air dampers fully opened the unit would not be bringing in all outside air because the return air damper would not close and some return air would bypass and mix with the air coming through the outside air damper.

When the economizer outside air and relief air dampers moved to the minimum position, the return air damper would not fully open and would restrict the airflow. This would possibly decrease the total fan CFM and increase the amount of outside air coming in and the amount of air going out through the relief damper.

An ERV is designed to bring in 250 CFM. It was measured with a fan powered flow hood and found to be only bringing in 150 CFM. What is the most likely cause for the low airflow?

If it is a new installation the duct could have openings (leaks), or it could be undersized. However, one should always check the filter. All filters are generally ignored by building operators.

Field Notes:

Generally, the engineering additional CFM designs to provide pressure differences will work. However, positive and negative air pressures between zones with designs based on extra CFM in those zones always needs to be checked in the field. The pressures are very small and can be influenced by wind outside of the building and the tightness of the buildings outside walls and the walls separating the Zones. The easiest and quickest check is with a chemical smoke stick that can verify the airflow direction at doors and between sections.

It is always the economical choice to have the exhaust and makeup air be at the lowest possible values. That way heating or cooling the 100% outside air being brought in will be minimalized and the operating expense will be lowered.