Clearing Make-Up Air Mysteries

Commercial kitchen operators are constantly hunting for a more efficient way to deliver make-up air. New scientific lab testing of exhaust hood efficiency clears a path to the make-up air devices that save energy and money.

The Delicate Balance. An exhaust hood evacuates a kitchen’s cooking vapors, but also the restaurant’s ambient air, which costs money to cool or heat. This is an especially expensive proposition in restaurants where kitchens meet customers in the open.

A vast majority of restaurant operators employ make-up air devices to replace that lost air in the kitchen. An efficient make-up air device can heat that air to about 55°F or cool it to 85°F and save an additional burden on heating, ventilating, and air conditioning units. But not all make-up air systems are created equal.

Clouding the Field. In conjunction with CaptiveAire and the California Energy Commission, the Commercial Kitchen Ventilation Laboratory has thoroughly examined the efficiency of commonly used exhaust hoods and make-up air devices. The lab tests confirm that many systems unnecessarily propel make-up air into the dining room atmosphere. They can even swell the total volume of exhaust air and cause effluents to spill in the kitchen. Some produce terrible downdrafts on cooks’ heads.

As a result, restaurateurs lose money on additional HVAC or exhaust burdens, and they struggle to maintain livable conditions in the kitchen.

A Breath of Fresh Air. The recent scientific testing (Continued next page.)
of exhaust efficiency has inspired a solution – CaptiveAire’s effective perimeter supply plenum system. Standard perimeter supply plenums provide a make-up air rate of 140-160 feet per minute (140-160 CFMs per linear foot). Moreover, perimeter supply plenums are highly versatile. To date, perimeter supply plenum make-up systems have been installed or retrofitted onto over 25,000 exhaust hoods across the country.

Lab testing helps uncover better ways to provide make-up air. Like never before, kitchen operators are enjoying access to a clear picture, making smarter purchases, and saving energy and money.

Making the Grade.

A+ Perimeter Supply Plenums. Perimeter supply plenums most efficiently deliver make-up air to kitchens. The key is installation. Based on lab testing and field experience, the 12-inch-wide perimeter supply plenums are best mounted 18 inches above the hood’s front lip. In this configuration, the make-up air rate is 140-160 feet per minute (140-160 CFMs per linear foot). If more make-up air is required, these plenums can be added to three sides of wall canopy hoods. With island hoods, plenums are installed on two or four sides.

B Back Wall. Despite its popularity in past years, the back wall design has limitations. Lab testing shows that a great amount of make-up air discharged from back wall make-up plenums enters the kitchen and becomes a load to the HVAC units. Also, back wall make-up systems can interfere with gas appliances.

C Front Face. In the front face hood, make-up air is discharged away from the hood, usually horizontally or at a slight downward angle. The front face make-up air device may be part of the hood or an attachment in front of the hood. This design often creates a negative pressure area and causes effluent spillage under the front lip of the hood. Also, make-up air mixes with room air, adding to the kitchen’s HVAC load. Typically, the mechanical system is not designed for that load. This translates to environmental dis-
comfort or the additional expense of energy to accommodate the extra load.

D Short Circuit. Short circuit hoods are similar to air curtain hoods, except that the make-up air is discharged inside the hood reservoir. The result is that the internal make-up is unavailable to push inward on the effluents from outside the hood, and hold the effluents inside the hood. Instead, the short circuit make-up system actually adds to the total volume of air that must be removed from the hood. These hoods typically operate at large make-up and exhaust rates – expending greater energy, while also spilling effluents.

F Air Curtain. Air curtain hoods do a poor job in delivering make-up air. First, discharging high velocity air at the front of the hood creates a low pressure area that induces cooking effluents to spill from the hood. As high velocity air flows downward and close to the low velocity cooking effluents flowing upward, turbulence causes exhaust spillage. Moreover, the high velocity downdraft distracts and discomforts cooks. (Note that using four-way HVAC diffusers near a hood produces the same problems.)

How much make-up air do you need? The PG&E Food Service Technology Center’s Outdoor Air Load Calculator (OALC) can help you determine how much make-air your kitchen needs. You can use this free software tool online or, after registration, download to your computer.

http://www.archenergy.com/oac/

- The Latest and Greatest in Hood Design: The ND-2

The ND-2 – CaptiveAire’s newest adaptation of its acclaimed ND exhaust hood line – is the most efficient and versatile yet.

Like its trailblazer predecessor, the ND-2 effectively captures grease-laden cooking vapors and provides up to 80 percent make-up air through optional front and side perforated supply plenums. Thanks to its newly insulated, rigid, double-wall front and highly aerodynamic design, the ND-2 also reduces radiant heat and prevents condensation.

The ND-2 series comes in heights of up to 30 inches, to facilitate high temperature cooking applications. The ND-2s are ETL-listed for use over cooking surface temperatures of 450°F, 600°F, and 700°F.

Additionally, the newest CaptiveAire hood comes with a sloped front to accommodate installations under low ceilings. It features easily accessible hanging angles with structural channels on top and wrapper channels on the bottom. The ND-2 is also lighter, due to rigid, single-wall end panels.

The ND-2’s standard three-inch back stand-off, a patent pending, fully-welded grease sub-assembly, and deep grease trough allow for easy cleaning.

The high-tolerance ND-2 exhaust hoods are manufactured in California, Oklahoma, and North Carolina via assembly line automation, which ensures quality, reduces lead times, and cuts customer costs.

For more details, call CaptiveAire at 800-334-9256, or go to the CaptiveAire website:
From the Founder, continued

fullest, most accurate picture of a ventilation system's effectiveness. This means customers have better information to make better buying decisions.

The expansion of automation technologies and testing are critical to enhancing quality and cost-savings in ventilation systems.

Continually moving forward keeps customers satisfied and makes cutting-edge American kitchen ventilation manufacturers competitive in a world market.

Bob Luddy
Founder & President

CaptiveAire’s ETL-Listed Energy Management System

CaptiveAire’s ETL-listed Energy Management System (EMS) reduces exhaust and airflow supply rates while permitting hoods to effectively capture the heat and smoke generated by cooking appliances. Using the EMS, fans operate on high-speed during cooking or low-speed when appliances are idle. Low-speed settings result in a 20 percent reduction in airflow, which translates to a 48 percent reduction in fan energy costs. The high- and low-speed settings are adjustable with variable frequency drives.

A duct-mounted temperature switch constantly monitors exhaust air temperature and forces the system to high- or low-speed. A 100 percent airflow override switch with an adjustable timer is included for heavy cooking applications. The EMS comes in various configurations which allow for control of up to four 5HP inverter duty motors. Typically, the EMS is installed in a utility cabinet on the hood, but may be wall mounted.

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