

MECHANICAL CODE DISCUSSION

Residential Hood Exhaust Fans

LAST YEAR in a discussion on Changes to the 2009 International Mechanical and Residential Codes, a brief mention was made to the requirement to provide makeup for residential kitchen hood exhaust fans drawing more than 400 CFM.

The specific code requirement states:

IRC M1503.4, IMC 505.2: *Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute shall be provided with makeup air at a rate approximately equal to the exhaust air rate. Such makeup air systems shall be equipped with a means of closure and shall be automatically controlled to start and stop simultaneously with the exhaust system.*

With Code Officials increasing enforcement this requirement, this subject is the focus of phone calls received several times a week, seeking direction on how to meet this requirement. Unfortunately, this often appears for the first time at final inspection, when the house is complete and the home owner is anxiously waiting to move in. At that point it is challenging to correct this final inspection item. Additional discussion of this code section may serve as a reminder to HVAC contractors and builders, minimizing these surprises at the end of the project. Reviewing the requirements, options available and relevant comments:

1. For fans moving less than 400 CFM, it is assumed the home will leak enough air to provide sufficient makeup air. For homes that are built extremely tight, makeup air may be needed for lower CFM exhaust rates to allow proper exhausting of cooking smokes and odors even though this is not a code requirement.
2. Most hood/fan sales literature exaggerates the airflow, listing a rate significantly higher than the fan actually moves. If the exhaust fan as installed does not exceed 400 CFM, no separate makeup air is required.
3. Many code officials have interpreted the code requirement to only require makeup of that volume in excess of 400 CFM, assuming leakage will replace the first 400 CFM. For example a fan exhausting a measured CFM of 900 CFM may only require makeup of 500 CFM, relying on infiltration or leakage to replace 400CFM. This is an interpretation that all code officials may not make- some may take this requirement literally as it is written, requiring replacement of the total amount exhausted. Others may make a judgment call based on the construction of the home, require some or all of the exhausted air to be replaced.
4. The typical installation that is currently observed includes a 6" or 8" spring closed damper and duct ran from outside to the return air system. The damper is driven open by a separate 24 volt transformer, with the 24 volt control voltage switched on by a pressure sensing switch, either negative pressure sensed on the intake side of the fan or positive pressure sensed on the discharge of the fan, opening the damper when the fan is on regardless of which speed. Virtually all kitchen hood exhaust fans are multi or variable speed, which does

Searching manufacturers' technical data for these residential kitchen hood exhaust fans, very few list detailed blower performance data. Without this data, the only option to determine approximate/actual CFM is measuring the flow. An exhaust hood recently installed in Salt Lake County with a 8" round pipe and an advertised CFM of 700, tested at 360 CFM. Makeup air was not required.



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not allow connecting the primary side of the transformer to the line voltage to the fan motor. A word of caution, connecting a transformer to the high speed only leg of a multi-speed exhaust fan motor is not an option as there will be a voltage on the high speed motor tap when the running at a speed other than high. The voltage on that high speed tap will be higher or lower than 120 volts and will burnout the transformer. The HVAC contractor will need to calculate the size of makeup air duct/damper that will provide the desire CFM.

5. One of the manufacturers of exhaust fans/hoods under the Broan and Best name; have in their product line a specific series kitchen and bath fans that communicate over the house wiring with an automatic makeup air/fresh air damper that connects to the return air duct system. The damper opens whenever one of the specific series of fans is operating in the home. This is not available as a retrofit item to other fans in Broan's line or other manufacturers.
6. A simple duct to the outside, continuously providing a large volume of outside air to the home normally not a solution as it will typically exceed the ventilation air requirements allowed by the energy code.

This is one of those areas that the builder may not be aware of. You may need to educate them as to the need and options available. Of course, there may be other control options that will meet the code requirements.

*Thanks again for your comments and suggestions, they are always welcome—
Brent 🙏*