

## DOCKETED

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*Comment Received From: Mike Moore*

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## **Comments related to ventilation requirements**

Please see attachment.

*Additional submitted attachment is included below.*



July 28, 2015

CALIFORNIA ENERGY COMMISSION  
Dockets Office, MS-4  
Re: Docket No. 15-BSTD-02  
1516 Ninth Street  
Sacramento, CA 95814-5512

Dear CEC Staff:

Thank you for your efforts on drafting the 2016 Residential Compliance Manual. No doubt this will be a great tool for specifiers, builders, and contractors. Following are comments and recommended edits written in ~~strikeout~~ and underline format that are focused on the ventilation requirements within the manual, especially those applicable to ASHRAE 62.2.

**Figure 4-28**

*[Comment: The figure should note that intermittent operation of the exhaust fan is permissible, provided it complies with Section 4.6.3.2. If "continuous" is the only option mentioned, some code enforcement officials may misinterpret this section as not permitting intermittent exhaust-only systems for whole-building ventilation.]*

**Section 4.6.2.2, Supply Ventilation, Page 4-77**

ASHRAE Standard 62.2 Section 4.3 requires the installer to measure the ventilation airflow rate in a CFI system to ensure that it will meet the ventilation rate requirements in each mode of operation, such as heating, cooling, and fan-only~~regardless of the heating or cooling load.~~

*[Comment: this is a very important distinction, as the fan-only operation mode could result in less than half the ventilation air delivered under the cooling mode. To ensure that minimum outdoor air requirements are met, the CFI system must be tested to deliver these rates in each operating mode that it will use to supply air.]*

**Section 4.6.3.2**

*[Comment: Please consider including a reference to CEC's database of [approved intermittent ventilation systems](#).]*

**Section 4.6.4.2**

*[Question/Comment: Does a builder using the performance path also have the option to model a Watt draw below 0.25 W/CFM? This section states that the builder can accept the default unless the design Watt draw exceeds 1.2 W/CFM, but it's not clear if the builder can model Watt draws*

*less than 0.25 W/CFM. Ventilation fans are available that have a Watt draw of less than 0.07 W/cfm, and their improvement upon system efficiency should be recognized here.]*

#### **4.6.5.1.1 Control and Operation for Intermittent Local Exhaust**

Bathrooms containing intermittent local exhaust are required to be provided with a humidity control, in accordance with Title 24, Part 11, Section 4.506. In other areas, such as kitchens, laundry rooms, and toilet rooms, [The choice of control is left to the designer, provided that a control is installed. It can be an automatic control like an occupancy sensor or a manual switch. Some products have multiple speeds and some switches have a delay-off function that continues the exhaust fan flow for a set time after the occupant leaves the bathroom. New control strategies continue to come to the market. ~~The only requirement is that there is a control.~~  
*[Comment: The language should be updated to reflect CALGreen requirements.]*

#### **4.6.5.1.2 Ventilation Rate for Intermittent Local Exhaust**

A minimum intermittent ventilation airflow of 100 cfm is required for the kitchen range hood and a minimum intermittent ventilation airflow of 50 cfm is required for the bath fan. The 100 cfm requirement for the range hood or microwave/hood combination is the minimum to adequately capture the moisture and other products of cooking and/or combustion. The kitchen exhaust requirement can also be met with either a ceiling or wall-mounted exhaust fan or with a ducted fan or ducted ventilation system that can provide at least 5 air changes of the kitchen volume per hour. Recirculating range hoods that do not exhaust pollutants to the outside cannot be used to meet the requirements of the ASHRAE Standard 62.2 unless paired with an exhaust system that can provide at least 5 air changes of the kitchen volume per hour.

Most range hoods provide more than one speed, with the high speed at 150 cfm or more – sometimes much more. Range hoods are available that are rated for 1,000 or 1,500 cfm on high speed and are often specified when large commercial-style stoves are installed. Care must be taken to avoid backdrafting combustion appliances when large range hoods are used. Refer to Table 5.1 in ASHRAE 62.2 for intermittent local ventilation exhaust airflow rates and to Section 6.4 in ASHRAE 62.2 for makeup air requirements associated with large exhaust appliances.

*[Comment: The text should be amended as noted to reflect acceptable system configurations (i.e., recirc hoods paired with exhaust systems) as well as considerations for makeup air requirements.]*

#### **4.6.6.1 Transfer Air**

ASHRAE Standard 62.2 requires that “measures be taken to minimize air movement across envelope components to occupiable spaces from garages, unconditioned crawlspaces, and unconditioned attics” as well as between dwelling units and corridors (Section 6.1 and 8.4.1). ~~the~~

air used for ventilation purposes come from the outdoors. Air may not be drawn in as transfer air from other spaces that are outside the occupiable space of the dwelling unit. This is to prevent airborne pollutants originating in those other spaces from contaminating the dwelling unit. For example, drawing ventilation air from the garage could introduce VOCs, or pesticides into the indoor air. Drawing ventilation air from an unconditioned crawlspace could cause elevated allergen concentrations in the dwelling such as mold spores, insects or rodent allergens. Likewise, drawing air from an adjacent dwelling could introduce unwanted contaminants such as cooking products or cigarette smoke. In addition to designing the ventilation system to draw air from the outdoors, the standard also requires that measures be taken to prevent air movement between adjacent dwelling units and between the dwelling unit and other adjacent spaces, such as garages. The measures can include air sealing of envelope components, pressure management and use of airtight recessed light fixtures. The measures must apply to adjacent units both above and below, as well as side by side. Air sealing must include pathways in vertical components such as party walls and walls common to the unit and an attached garage; and in horizontal components such as floors and ceilings. Pipe and electrical penetrations are examples of pathways that require sealing. Section 6.1 of ASHRAE 62.2 does not prohibit whole-building exhaust or local exhaust ventilation systems, and does not require mechanical systems to maintain pressure relationships with adjacent spaces except as required by Section 6.4 of ASHRAE 62.2.

*[Comment: This proposed change clarifies the standard's position on transfer air. For example, the standard does not require that transfer air be eliminate (as this is virtually impossible), but that measures be taken to reduce it.]*

#### **4.6.6.4 Combustion and Solid-Fuel Burning Appliances**

ASHRAE Standard 62.2 requires that the vent system for combustion appliances be properly installed, as specified by the instructions from the appliance manufacturer and by the California Building Code. Compliance with the venting requirements will involve determining the type of vent material to be used, the sizing of the vent system, and vent routing requirements.

ASHRAE Standard 62.2 includes a provision intended to prevent backdrafting where one or more large exhaust fans are installed in a home with atmospherically vented or solid fuel appliances. If the two largest exhaust fans have a combined capacity that exceeds 15 cfm/100 ft<sup>2</sup> of floor area, then ~~an electrically interlocked makeup air fan must be installed~~ provided so that the net exhaust is less than 15 cfm/100 ft<sup>2</sup> with either or both fans operating. This provision applies only when the atmospherically vented appliance is inside the pressure boundary of the house, and does not include a summer cooling fan which is designed to be operated with the windows open. Direct-vent appliances are not considered "atmospherically vented."

The 2 largest exhaust fans are normally the kitchen range hood and the clothes dryer (if located inside the dwelling unit pressure boundary). ~~Many~~ Large range hoods, particularly down draft range hoods, can have capacities of 1,000 cfm or more.

A problem with this requirement can be solved in one of three ways. First, all atmospherically vented combustion appliances can be moved outside the pressure boundary of the house (to the garage or other similar space). Second, the flowrate of one or more of the fans can be reduced so that the combined flow is less than 15 cfm/100 ft<sup>2</sup>. Finally, makeup air ~~a supply fan~~ can be provided ~~installed~~ to balance the flow ~~offset the net exhaust rate~~.

*[Comment: Where "compensating outdoor air" is provided in accordance with Section 6.4, ASHRAE 62.2 does not require powered makeup air, nor does it require a 1:1 ratio between the makeup air and the exhaust air of the two largest exhaust appliances. Rather, the language in Section 6.4 is intentionally vague, and permits the designer to provide makeup air through passive or active means, dedicated makeup air systems, or even through infiltration. More recent versions of ASHRAE 62.2, the IRC, and the IMC have been clarified to reflect these makeup air design options. For example, when designing a makeup air system, one of the most important design parameters is the design depressurization limit, which is the maximum acceptable depressurization of the dwelling unit. This limit is impacted by the type of combustion appliance within the pressure boundary. The available infiltration that can be credited towards the makeup air requirement can be determined if the dwelling unit's air tightness and acceptable design depressurization level are known. Broan-NuTone has developed a freely accessible [makeup air tool](#) that can be used to specify makeup air systems based on such design parameters. In addition to making these recommended edits to the text, please change the examples to reflect the fact that powered makeup air is not required.]*

#### **4.6.7.3 Airflow Rating**

... If using the prescriptive duct sizing table (Table 4-16 below), ~~t~~The fan's certified airflow rating must be based on tested performance at the 0.25 inch w.c. operating point.

*[Comment: Ratings at 0.25 inch w.c. are not required by the standard unless using the prescriptive table for duct sizing. Fans are commonly rated at 0.1 inch w.c., and can be approved if flow rates are field-verified or if their duct sizing is prescribed by manufacturers.]*

...

The prescriptive duct design criteria given in Table 4-16 provide maximum duct lengths based on various duct diameters and duct type. As can be seen, the higher the flow, the larger in diameter or shorter in length the duct has to be. Also note that smooth duct can be used to manage longer duct runs. Interpolation and extrapolation of Table 4-16 (Table ~~7.4~~ 5.3 of ASHRAE 62.2) is not allowed. For airflow values not listed, use the next higher value. The table is not applicable for systems with airflow greater than 125 cfm at 62 Pa (0.25 inches of water column) static pressure.

*[Comment: This change provides the correct reference to a table within 62.2.]*

#### **4.6.8.2 Other Requirements**

~~In order to verify compliance with these requirements, a blower door test must be conducted on each individual dwelling unit, following the procedures of RA3.8, as if the unit were exposed to outdoor air on all sides, top, and bottom by opening all doors and windows of all adjacent dwelling units.~~

*[Comment: A blower door test is one optional form of compliance with 8.4.1, but not the only form.]*

Thanks for the opportunity to provide these comments. If there are follow-up questions, I would be happy to discuss further with staff.

Sincerely,

A handwritten signature in black ink that reads "Mike Moore". The signature is written in a cursive, slightly slanted style.

Mike Moore, P.E.  
ASHRAE 62.2 Indoor Air Quality Subcommittee Chair