Make-Up Air Fact Sheet

November 1, 2012

Navigating the codes and standards requirements for make-up air (MUA) can be a real challenge for builders and contractors. Broan-NuTone and BEST have the products and the design expertise to customize code-compliant solutions for the industry.

What is MUA?*

- Make-up air (MUA): Outdoor air and transfer air intended to replace exhaust air
- Outdoor air (OA): air that enters a building through a ventilation system, through intentional openings for natural ventilation, or by infiltration
- Transfer air: Air moved from one indoor space to another

> MUA is **NOT** intended for combustion air for space or water heating appliances. Combustion air must be provided separately.

*Definitions adapted from ASHRAE 62.1

Where does MUA come from?

- Intentional openings (like an outdoor air duct with a damper)
- Infiltration through naturally occurring cracks and gaps in the building envelope
- Can be introduced into the same space as the exhaust appliance or into a separate indoor space*
- Can be introduced into the return trunk of a centrally ducted heating and/or cooling system (see IRC M1602.1)

*The IRC does not specifically address where MUA comes from, but the International Mechanical Code Section 403.4, Section 403.2.2, Table 403.3.1.2 footnote "e", and ASHRAE 62.1's definitions of MUA, OA, and transfer air support this explanation. Also see IRC G2439.4, which permits MUA to be provided through a louvered door – meaning that MUA can be transferred from other indoor spaces.

Why provide MUA?

- Meet code requirements
- Maintain good indoor air quality by avoiding excessive depressurization during operation of exhaust appliances
- If unchecked, excessive depressurization can reduce flow rate of exhaust appliances and lead to improper venting of combustion appliances

MUA Requirements in Codes and Standards

- International Residential Code (IRC), 2009 & 2012 versions
  - o Section 1503.4: required for Range Hoods > 400 CFM
  - o Must be "approximately equal to the exhaust air rate"
  - o Must be "equipped with a means of closure that is automatically controlled to start and operate simultaneously with the exhaust system"
- International Mechanical Code (IMC), 2009 & 2012 versions
  - o Section 505.2: same requirements as Section 1503.4 of the IRC
- ASHRAE 62.2 (62.2): Section 6.4 of the 2007 and 2010 versions; required when the maximum flow of the two largest-volume exhaust appliances exceeds 15 CFM/100 sqft of habitable area (i.e., 300 cfm for 2000 sqft)

MUA is Recommended in Dwellings with One or More of the Following Conditions

- Large range hoods (those over 300 CFM)
- Newer energy efficient, "tight" or "green" dwellings that are well air-sealed – OA will have more trouble finding a way in to replace exhausted air, as opposed to older draftier homes
- Dwellings with natural vented combustion appliances (i.e., a water heater or natural draft fireplace), which are more susceptible to improper venting if depressurization occurs in the dwelling

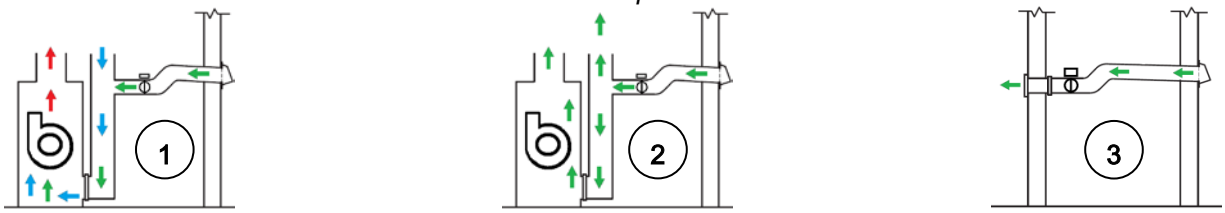
How Should Range Hood MUA Systems be Sized to be Code-Compliant?

- Use Broan's On-Line MUA Specifier Tool
  - o Identifies the latest state-level code requirements
  - o Less familiar Tool entries include:
    - Available Static Pressure at Intersection of OA Duct and Return Trunk: the negative pressure available to draw outdoor MUA into the return trunk of a central duct system.
    - Design Depressurization Limit (DDL): the designer-selected maximum depressurization of the home with respect to outdoors (measured in Pascals – Pa – or inches water gauge – in w.g.). Industry recommended values depend on the type of combustion equipment in the dwelling, and are as follows:

DDL (Pa)*	Combustion Appliance Description	
5	• Individually vented natural draft • Mechanically assisted draft boiler or furnace commonly vented with water heater	
15	• Mechanically assisted draft boiler or furnace alone, or • Fan assisted domestic hot water alone	
50	• Direct-vented/sealed combustion appliances	

Installation Options

"*Dilution of return air with outdoor air shall be permitted*." - IRC M1602.1



- 1: Trigger operation of central fan when the MUAD opens. This increases flow through the MUAD based on the available static pressure in the return trunk.
- 2: No connection between operation of central fan and the MUAD. Flow through the MUAD depends primarily on the home's design depressurization limit and secondarily on whether the central fan's run time overlaps with the MUAD operation.
- 3: Routed to interior register
- Universal MUAD, Direct-Wire, LinkLogic, and Slave Dampers are available

Climatic Considerations

- When tied into the return trunk of gas-fired forced air furnace, check furnace manufacturer warranty limitations that may constrain OA intake. The following general guidance is not intended to replace manufacturer guidance, but is offered as a rule of thumb:

IECC Climate Zone	Max Recommended OA MUA Flow as % of Total Furnace Air Handler Flow
1	No limit (but keep within reason)
2	40%
3	30%
4	25%
5	20%
6	15%

- If located in an especially hot and humid climate, consider triggering the central AC to run automatically when the MUAD is open and the thermostat is set to "Cool" mode.