**Back-Draft Dampers at Shared Common Exhaust Duct**

**Last Updated:** 07/17/2017

**Scope**

- If multiple exhaust fans in the home share a common exhaust duct, back-draft dampers are installed for each fan.
  - Inspect each fan to see if it has an integral back-draft damper.
  - If no back-draft damper is included, install dampers immediately above each fan to ensure that each fan has its own damper.
  - Remove packing tape from the back-draft dampers before installing.

See the [Compliance Tab](#) for related codes and standards requirements, and criteria to meet national programs such as DOE’s Zero Energy Ready Home program, ENERGY STAR Certified Homes, and Indoor airPLUS.
Description

Exhaust fans should always be ducted to a location outside the home (see the guides Kitchen Exhaust and Bathroom Exhaust). Ideally, each exhaust fan should have its own individual duct to the outside. However, builders sometimes prefer to connect the exhaust fans to a common exhaust duct, for reasons of layout or a wish to minimize penetrations through the roof. A common exhaust duct can be used if each fan has a back-draft damper to prevent cross-contamination when the fan is not running. In very humid climates, HVAC installers will sometimes also install a motorized damper in the duct closer to the roof outlet to prevent moist air from drifting in when the fan is off and condensing on fan parts or entering the home. Some exhaust fan models come with an integral motorized damper to prevent airflow when the fan is not operating. Inspect the fans and add a damper if one is not already included with the fans.

How to Install Back-Draft Dampers in Exhaust Fans to Make a Shared Duct Possible

1. Install back-draft dampers where the exhaust duct meets the exhaust fan in each fan unit. The dampers should open when the fan is actively exhausting and should shut when the fan is off (Figures 1 and 2). When the exhaust fan is operating, the back-draft damper is pushed open by airflow to allow air to exit through the exhaust duct (Figure 3).

2. Remember to remove any packing tape used to hold the dampers closed during shipping.
Figure 3 - The back-draft damper opens when the fan is actively exhausting and closes when the fan is off. (Image courtesy of Calcs Plus).
Ensuring Success

In homes with multiple exhaust fans, the HERS rater will inspect the ventilation system exhaust ducts to ensure that one of the following is true: 1) each unit has its own exhaust duct that is individually ducted to the outside, or 2) if the units share a common exhaust duct, each fan has a back-draft damper to prevent cross-contamination when the fan is not running.
Climate

Mechanically controlled dampers limit ventilation to prevent over-ventilation in humid or extreme temperature conditions.
Training

Right and Wrong Images

Display Image: ES_HVAC_QIRC_8.3_8.4_PG90_143b_102811.jpg
Compliance

The Compliance tab contains both program and code information. Code language is excerpted and summarized below. For exact code language, refer to the applicable code, which may require purchase from the publisher. While we continually update our database, links may have changed since posting. Please contact our webmaster if you find broken links.

**ENERGY STAR Certified Homes, Version 3/3.1 (Rev. 09)**

This topic is not specifically addressed.

**DOE Zero Energy Ready Home (Revision 07)**

Exhibit 1 Mandatory Requirements.
Exhibit 1, Item 1) Certified under the ENERGY STAR Qualified Homes Program or the ENERGY STAR Multifamily New Construction Program.
Exhibit 1, Item 6) Certified under EPA Indoor airPLUS.

**ASHRAE 62.2-2010, ASHRAE 62.2-2013, and ASHRAE 62.2-2016**

ASHRAE Standard 62.2-2010 Ventilation for Acceptable Indoor Air Quality in Low-Rise Residential Buildings (available for purchase at link above). The standard provides minimum requirements for mechanical and natural ventilation systems intended to provide acceptable indoor air quality in low-rise residential buildings.

**2009 IECC**

Section 403.5 Mechanical ventilation (Mandatory). Automatic or gravity dampers are installed on all outdoor air intakes and exhausts.

**2012, 2015, and 2018 IECC**

Section R403.5 (R403.6 in 2015 and 2018 IECC) Mechanical ventilation shall meet the requirements of the International Residential Code or the International Mechanical Code. Automatic or gravity dampers are installed on all outdoor air intakes and exhausts.


Section R101.4.3 (Section R501.1.1 in 2015 and 2018 IECC). Additions, alterations, renovations, or repairs shall conform to the provisions of this code, without requiring the unaltered portions of the existing building to comply with this code. (See code for additional requirements and exceptions.)

**2009 IRC**

Section M1507.3 Ventilation rate. Kitchen fans should have an exhaust rate of 100 cfm intermittent or 25 cfm continuous.

**2012 IRC**

M1503 Range hoods should discharge to the outdoors through a metal duct made of galvanized steel, stainless steel, or copper; with a smooth interior surface that is air tight and equipped with a back draft damper. The duct should be independent of other exhaust systems and should not terminate in an attic, crawl space, or other inside space. Exhaust fans capable of exhausting 400 cfm should be mechanically or naturally provided with make-up air at a rate equal to the exhaust air rate. The make-up air system should have a gravity or electrically operated damper that automatically opens when the system operates and that is accessible for inspection.

M1505 Open-top broiler units should have a min. 28-gauge metal exhaust hood with ¼-inch clearance between the hood and the underside of combustible material or cabinets. The hood should be at least as wide as the broiler, and extend over the entire unit, discharge to the outdoors, and be equipped with a back draft damper.

M1506 Exhaust opening should terminate at least 3 feet from property lines, 3 feet from operable and non-operable openings into the building, and 10 feet from mechanical air intakes, except where the opening is located 3 feet above the air intake.

Section M1507.4 Minimum Required Local Exhaust Rates for One- and Two-Family Dwellings. Kitchen fans should have an exhaust rate of 100 cfm intermittent or 25 cfm continuous.

**2015 IRC**

Same as 2012. Duct length and diameters are specified in Table M1506.2 and are based on the fan flow rate, which should be in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.


Section N1101.3 (Section N1107.1.1 in 2015 and 2018 IRC). Additions, alterations, renovations, or repairs shall conform to the provisions of this code, without requiring the unaltered portions of the existing building to comply with this code. (See code for additional requirements and exceptions.)

Appendix J regulates the repair, renovation, alteration, and reconstruction of existing buildings and is intended to encourage their
continued safe use.
References and Resources*

1. **2009 IECC - International Energy Conservation Code**  
   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** January, 2009  
   Code establishing a baseline for energy efficiency by setting performance standards for the building envelope (defined as the boundary that separates heated/cooled air from unconditioned, outside air), mechanical systems, lighting systems and service water heating systems in homes and commercial businesses.

2. **2009 IRC - International Residential Code for One and Two Family Dwellings**  
   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** January, 2009  
   Code for residential buildings that creates minimum regulations for one- and two-family dwellings of three stories or less. It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences.

   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** January, 2012  
   Code establishing a baseline for energy efficiency by setting performance standards for the building envelope (defined as the boundary that separates heated/cooled air from unconditioned, outside air), mechanical systems, lighting systems and service water heating systems in homes and commercial businesses.

4. **2012 IRC - International Residential Code for One and Two Family Dwellings**  
   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** January, 2012  
   Code for residential buildings that creates minimum regulations for one- and two-family dwellings of three stories or less. It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences.

5. **2015 IECC - International Energy Conservation Code**  
   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** May, 2014  
   Code establishing a baseline for energy efficiency by setting performance standards for the building envelope (defined as the boundary that separates heated/cooled air from unconditioned, outside air), mechanical systems, lighting systems and service water heating systems in homes and commercial businesses.

6. **2015 IRC - International Residential Code for One and Two Family Dwellings**  
   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** May, 2014  
   Code for residential buildings that creates minimum regulations for one- and two-family dwellings of three stories or less. It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences.

   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** January, 2017  
   Code establishing a baseline for energy efficiency by setting performance standards for the building envelope (defined as the boundary that separates heated/cooled air from unconditioned, outside air), mechanical systems, lighting systems and service water heating systems in homes and commercial businesses.

8. **2017 IRC - International Residential Code for One and Two Family Dwellings**  
   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** January, 2017  
   Code for residential buildings that creates minimum regulations for one- and two-family dwellings of three stories or less. It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences.

   **Author(s):** International Code Council  
   **Organization(s):** ICC  
   **Publication Date:** January, 2019  
   Code establishing a baseline for energy efficiency by setting performance standards for the building envelope (defined as the boundary that separates heated/cooled air from unconditioned, outside air), mechanical systems, lighting systems and service water heating systems in homes and commercial businesses.

10. **2019 IRC - International Residential Code for One and Two Family Dwellings**  
    **Author(s):** International Code Council  
    **Organization(s):** ICC  
    **Publication Date:** January, 2019  
    Code for residential buildings that creates minimum regulations for one- and two-family dwellings of three stories or less. It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences.
8. **2018 IRC - International Residential Code for One and Two Family Dwellings**
   Author(s): International Code Council
   Organization(s): ICC
   Publication Date: August, 2017
   Code for residential buildings that creates minimum regulations for one- and two-family dwellings of three stories or less. It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences.

   Author(s): ASHRAE
   Organization(s): ASHRAE
   Publication Date: January, 2013
   Standard defining the roles of and minimum requirements for mechanical and natural ventilation systems and the building envelope intended to provide acceptable indoor air quality in low-rise residential buildings.

10. **DOE Zero Energy Ready Home National Program Requirements (Rev. 07)**
    Author(s): U.S. Department of Energy
    Organization(s): DOE
    Publication Date: May, 2019
    Standard requirements for DOE’s Zero Energy Ready Home national program certification.

11. **ENERGY STAR Certified Homes, Version 3/3.1 (Rev. 09) National Program Requirements**
    Author(s): U.S. Environmental Protection Agency
    Organization(s): EPA
    Publication Date: September, 2018
    Webpage with links to documents providing the program requirements and checklists for ENERGY STAR Certified Homes (Ver. 3/3.1, Rev. 09).

12. **Local Exhaust and Whole House Ventilation Strategies**
    (2MB)
    Author(s): Rudd
    Organization(s): Building Science Corporation
    Publication Date: February, 2011
    Report on whole-house and spot ventilation strategies for improved indoor air quality.

13. **The Ventilation Omission That Can Make You Sweat**
    Author(s): Bailes
    Organization(s): Green Building Advisor
    Publication Date: October, 2013
    Article about installing balanced ventilation systems.

*Publication dates are shown for formal documents. Dates are not shown for non-dated media. Access dates for referenced, non-dated media, such as web sites, are shown in the measure guide text.

**Contributors to this Guide**
The following authors and organizations contributed to the content in this Guide.

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