

RESIDENTIAL INDOOR AIR QUALITY AND MECHANICAL VENTILATION

All newly constructed low-rise residential buildings or additions that are greater than 1,000 ft² shall meet the requirements of ANSI/ASHRAE Standard 62.2 for Indoor Air Quality and Mechanical Ventilation. This is a mandatory measure requirements from 2008 *Building Energy Efficiency Standards* sections 150 (o) and 152(a) effective on January 1, 2010 (for more details see www.energy.ca.gov/titile24). ASHRAE Standard 62.2 specifies two mechanical ventilation requirements: Local Exhaust and Whole-Building Ventilation.

1. Local Exhaust Ventilation:

Bathrooms

A bathroom is defined as any room containing a bathtub, a shower, a spa, or similar source of moisture. Each bathroom in the addition is required to have an exhaust fan ducted to the outside with a minimum ventilation rate of 50 cfm. The ducting for the exhaust fan shall be sized according to ASHRAE Standard 62.2 Table 7.1 (see *ASHRAE Standard 62.2 Table 7.1* on page 3). Depending on the type of ducting and the cfm of the exhaust fan, Table 7.1 is used to size the diameter of the duct and determine the maximum length in feet of the duct. Using Table 7.1 is the Prescriptive Approach for duct sizing to ensure that the fan will provide the minimum ventilation rate required. These local exhaust fans may operate continuously or intermittently. Installing local exhaust fans in each bathroom will allow the home occupant to regulate the indoor air quality when needed.

NOTE: Bathrooms in the existing home are not required to meet the Local Exhaust Ventilation requirements.

Provide a note block on the plans that identifies each bathroom has an exhaust fan that provides a minimum ventilation rate of 50 cfm, with a duct diameter and maximum duct length according to Table 7.1 similar to the note block provided below:

Local Exhaust Bathroom Ventilation Rate Summary

Enter the required fan flow rate (cfm).

☐ Bathroom Fan Flow (cfm) = _____ (# of Bathrooms _____)

Use the fan flow rate from this summary for selection of the local ventilation fan and for the duct design for the local ventilation system from Table 7.1.

☐ Duct Size (in) = _____

☐ Maximum Allowable Duct Length (ft) = _____

Kitchens

A kitchen is defined as any room containing cooking appliances. Each kitchen in the addition is required to have an exhaust fan ducted to the outside with a minimum ventilation rate of 100 cfm. The range hood over the stove may be used to meet this requirement, but the range hood must vent to the outside; re-circulating range hoods cannot be used. The ducting for the exhaust fan shall be sized according to ASHRAE Standard 62.2 Table 7.1 as described above (see *ASHRAE Standard 62.2 Table 7.1* on page 3). This local exhaust fan may operate continuously or intermittently. Installing this local exhaust fan in the kitchen will allow the home occupant to regulate the indoor air quality when needed.

NOTE: Kitchens in the existing home are not required to meet the Local Exhaust Ventilation requirements.

Provide a note block on the plans that identifies each kitchen has an exhaust fan that provides a minimum ventilation rate of 100 cfm, with a duct diameter and maximum duct length according to Table 7.1 similar to the note block provided below:

Local Exhaust Kitchen Ventilation Rate Summary

Enter the required fan flow rate (cfm).

☐ Kitchen Fan Flow (cfm) = _____ (# of Kitchens _____)

Use the fan flow rate from this summary for selection of the local ventilation fan and for the duct design for the local ventilation system from Table 7.1.

☐ Duct Size (in) = _____

☐ Maximum Allowable Duct Length (ft) = _____

Sound Rating

Majority of the local exhaust fans will operate intermittently, and are required to be rated for sound at a maximum of 3 sone, unless their maximum rated airflow exceeds 400 cfm (200 L/s).

2. Whole-Building Ventilation:

In addition to the local exhaust fans in the bathrooms and kitchens, an exhaust fan shall be sized to provide ventilation for the whole house. The minimum ventilation rate for the whole-building exhaust fan shall be calculated according to ASHRAE Standard 62.2 Equation 4.1(a) (below). The conditioned floor area and the number of bedrooms in the home (the existing house and the addition) will determine the minimum ventilation rate. One of the local exhaust fans in the bathrooms or kitchens may be used to meet the whole-building ventilation, provided the exhaust fan meets the minimum ventilation rates for both the Local Exhaust and Whole-Building Ventilation requirements. The ducting for the whole-building exhaust fan shall be sized according to ASHRAE Standard 62.2 Table 7.1 as described above (see *ASHRAE Standard 62.2 Table 7.1* on page 3), and this exhaust fan shall operate continuously.

NOTE: The whole-building exhaust fan may be installed in either the addition or the existing home.

Provide a note block on the plans identifying a whole-building exhaust fan that provides a minimum ventilation rate according to Equation 4.1(a) below, with a duct diameter and maximum duct length according to Table 7.1 similar to the note block below:

Whole-Building Ventilation Rate Summary

Enter the required fan flow rate (cfm).

☐ Continuous Fan Flow (cfm) = _____

Use the fan flow rate from this summary for selection of the whole-building ventilation fan and for the duct design for the whole-building ventilation system from Table 7.1.

☐ Duct Size (in) = _____

☐ Maximum Allowable Duct Length (ft) = _____

ASHRAE Standard 62.2 Equation 4.1(a):

The whole-building exhaust fan shall provide a minimum ventilation rate according to Equation 4.1(a) below:

$$Q_{fan} = 0.01A_{floor} + 7.5(N_{br} + 1)$$

Where:

Q_{fan} = fan flow rate, (cfm)

A_{floor} = conditioned floor area (existing home and the addition), ft²

N_{br} = number of bedrooms (existing home and the addition); not to be less than one

Here is an example of how to complete the equation for an existing 2,500 ft² house with 5 bedrooms and a 1,200 ft² addition with 1 bedroom:

$$Q_{fan} = 0.01(3,700) + 7.5(6 + 1)$$

$$Q_{fan} = 37 + 7.5(7)$$

$$Q_{fan} = 37 + 52.5$$

$$Q_{fan} = 89.5 \text{ cfm}$$

NOTE: This equation should be included on the plans along with the whole-building ventilation note block above.

Sound Rating and Continuous Operation

The whole-building ventilation exhaust fan will operate continuously, and is required to be rated for sound at a maximum of 1 sone. This exhaust fan can be controlled by a standard on/off switch, but the switch must be labeled to inform the occupant that the exhaust fan is the whole-building ventilation exhaust fan and is intended to operate continuously. No specific wording is mandated, but the wording needs to make clear what the control is for and the importance of operating the system. This may be as simple as "Ventilation Control" or might include wording such as: "Operate when the house is in use" or "Keep on except when gone over 7 days" or "Fan is to be left on to ensure indoor air quality."

ASHRAE Standard 62.2 Table 7.1

Table 7.1 Prescriptive Duct Sizing Requirements								
Duct Type	Flex Duct				Smooth Duct			
Fan Rating cfm @ 0.25 in. w.g.	50	80	100	125	50	80	100	125
Maximum Allowable Duct Length (ft)								
Diameter, (in)	Flex Duct				Smooth Duct			
3	X	X	X	X	5	X	X	X
4	70	3	X	X	105	35	5	X
5	NL	70	35	20	NL	135	85	55
6	NL	NL	125	95	NL	NL	NL	145
7 and above	NL	NL	NL	NL	NL	NL	NL	NL
This table assumes no elbows. Deduct 15 ft of allowable duct length for each turn, elbow, or fitting.								
NL = no limit on duct length of this size								
X = not allowed, any length of duct of this size with assumed turns, elbows, fittings will exceed the rated pressure drop								