

Ventilation

United States Residential Ventilation Requirements

Originator	Continuous Ventilation Requirements (Residential)	Intermittent Ventilation Requirements (Residential)
Residential Ventilation Standards Authored by HVI (Home Ventilating Institute)	0.35 Air changes per hour, but not less than 15 CFM per person	Kitchen Range Hoods: 40 CFM Minimum Per Foot Width (30" Wide - 100 CFM Minimum) Kitchen Wall/Ceiling Fans: 15 Air Changes Per Hour Bathrooms: 8 Air Changes Per Hour
ASHRAE 62-1989 Authored by ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers)	0.35 Air changes per hour, but not less than 15 CFM per person (based on two persons for the first bedroom plus one person for each additional bedroom) Alternately, Natural Infiltration	Kitchen: 100 CFM Minimum; Alternately, 25 CFM Continuous; Alternately, Openable Window(s) Bathrooms: 50 CFM Minimum; Alternately, 20 CFM Continuous; Alternately, Openable Window(s)
Uniform Building Code (UBC) Authored by ICBO (International Conference of Building Officials)	ASHRAE 62-1989 (See Above)	ASHRAE 62-1989 (See Above)
National Building Code (NBC) Authored by BOCA (Building Officials and Code Administrators International)	ASHRAE 62-1989 (See Above)	ASHRAE 62-1989 (See Above)
Standard Building Code (SBC) Authored by SBCCI (Southern Building Code Congress Intl, Inc.)	ASHRAE 62-1989 (See Above)	ASHRAE 62-1989 (See Above)

Ventilation

Ventilation Formulas

Continuous Ventilation

$$\text{cfm L/s} = \frac{\text{Volume of Living Space} \times \text{Air Changes per Hour}}{60}$$

(Basement not included, but may be required by some codes.)

Intermittent Ventilation - Bathroom

(8 Air Changes Per Hour)

$$\text{cfm} = \text{sq ft} \times 1.067$$
$$\text{L/s} = \text{m}^2 \times 5.419$$

Intermittent Ventilation - Kitchen Exhaust Fan

(15 Air Changes Per Hour)

$$\text{cfm} = \text{sq ft} \times 2$$
$$\text{L/s} = \text{m}^2 \times 10.18$$

Intermittent Ventilation - Kitchen Range Hood

cfm: 40 cfm minimum per foot of range width
(30" range = 100 cfm min hood)

L/s: 0.619 L/s minimum per cm of range width
(75 cm range = 47 L/s min hood)

Reference Charts - Ventilation Requirements / Formulas

Suggested Air Changes

Type of Building	Minute Air Change
Assembly Halls	3 - 10
Auditoriums	4 - 15
Bakeries	1 - 3
Banks	3 - 10
Bars	2 - 4
Beauty Parlors	2 - 5
Boiler Rooms	2 - 4
Bowling Alleys	2 - 8
Churches	4 - 15
Corridors	6 - 20
Dry Cleaners	1 - 5
Engine Rooms	1 - 15
Factor (General Ventilation)	5 - 10
Factory (Fumes)	1 - 5
Forge Shops	1 - 2
Foundries	1 - 4
Garages (Repairs)	2 - 10
Generating Rooms	2 - 5
Glass Plants	1 - 2
Gymnasiums	2 - 10
Heat Treat Rooms	.05 - 1
Kitchens	1 - 3

Type of Building	Minute Air Change
Laundries	2 - 5
Locker Rooms	2 - 5
Machine Shops	3 - 5
Mills (Paper)	2 - 3
Mills (Textile)	5 - 15
Offices	2 - 8
Packing Houses	2 - 5
Production Rooms	1 - 2
Projection Rooms	1 - 3
Recreation Rooms	2 - 8
Residences	2 - 5
Restaurants	5 - 10
Retail Stores	3 - 10
Sales Rooms	3 - 10
Shops (General Ventilation)	3 - 10
Stores	5 - 10
Theaters	3 - 8
Toilets	2 - 5
Transformer Rooms	1 - 5
Turbine Room Electrical	2 - 6
Waiting Rooms	10
Warehouses	2 - 10

In selecting the size & capacity of a fan, find the total cubic feet of air space of the building and divide by the number of air changes necessary to give proper ventilation.

$$CFM = \frac{\text{Building volume in cubic feet}}{\text{Minute air change}}$$

EXAMPLE:

A building 100' long x 60' wide with a 20' ceiling: Multiply 100 x 60 x 20 = 120,000 cubic feet. Assuming a 6 minute air change is required: 120,000 cubic feet of air divided by 6 gives you the 20,000 CFM required to change the air every 6 minutes.