Standard 62.2 and Existing Buildings

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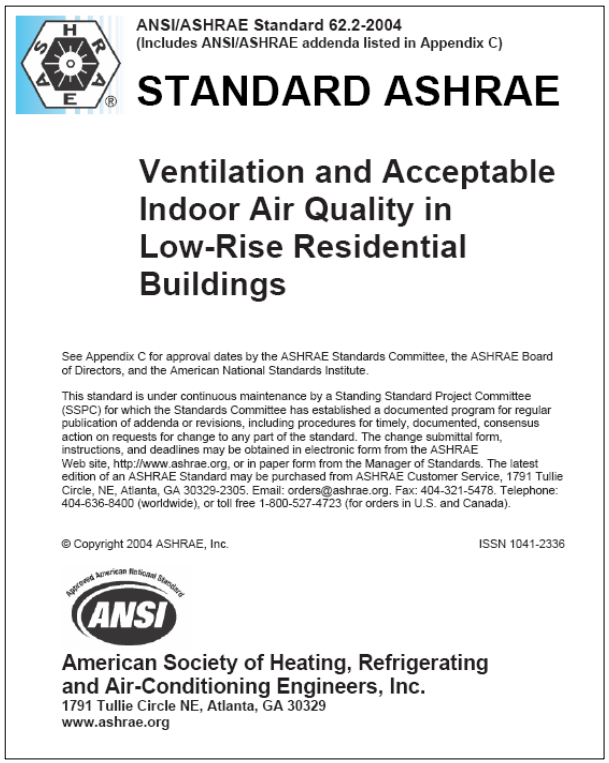
Overview

- Brief history
- Ventilation vs. infiltration
- Standard 62.2 requirements
  - Whole-house
  - Source control
  - Specs
- Existing Buildings
  - Credits
  - Other considerations



ANSI/ASHRAE Standard 62.2-2004
(Includes ANSI/ASHRAE addenda listed in Appendix C)

STANDARD ASHRAE

Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings

See Appendix C for approval dates by the ASHRAE Standards Committee, the ASHRAE Board of Directors, and the American National Standards Institute.

This standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. The change submittal form, instructions, and deadlines may be obtained in electronic form from the ASHRAE Web site, http://www.ashrae.org, or in paper form from the Manager of Standards. The latest edition of an ASHRAE Standard may be purchased from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. Email: orders@ashrae.org. Fax: 404-321-5478. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in U.S. and Canada).

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Why Do We Ventilate?

- Pollutant removal

- Fresh air for people
- Air for combustion appliances

Brief History

- Originally one ventilation standard, ASHRAE 62 (62-2001 last version)
  - Required 15 cfm/person or 0.35 ACH
  - This rate based on body odor

- Split into low-rise residential (62.2) and everything else (62.1)

Brief History

- Std 62.2 is a “continuous maintenance” standard, meaning there is always a committee active and that changes are always being considered.
- New full version every 3 years (2010 is next), incorporating all approved addenda since the last full release

What Std. 62.2 ***is***

- for residential buildings no more than 3 stories
- to provide acceptable IAQ under typical conditions
- specifications for whole-house ventilation, spot ventilation, and fan specs

What Std. 62.2 ***is NOT***

- a guarantee of acceptable IAQ under all conditions
- a “best practices” standard (see the companion ASHRAE Guideline 24)

Moisture?

- Standard 62.2 is NOT a moisture control standard
  - except spot ventilation
- Targets a consistent rate
- Moisture not consistent, either throughout the year or regionally

Moisture?

- Other pollutants, e.g. Formaldehyde, Ozone, etc., are ALWAYS better if the levels are LOWER

- NOT TRUE for moisture

Moisture?

- Control of other pollutants, e.g. Formaldehyde, Ozone, etc., is mostly limited to ventilation

- NOT TRUE for moisture

Moisture?

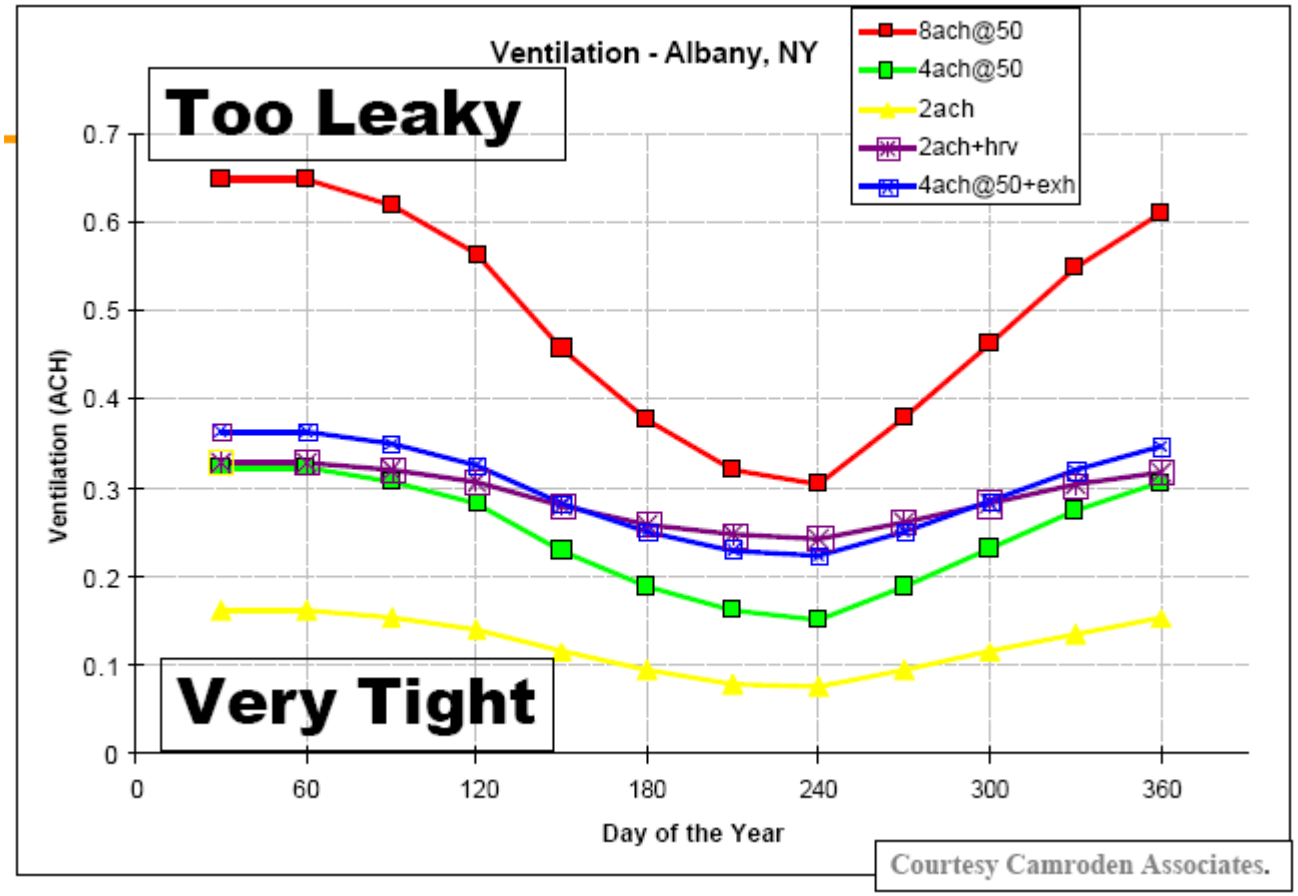
- Provide sufficient ventilation to keep other pollutants low

- Deal with any resulting moisture problems separately

Ventilation vs. Infiltration

- Ventilation is primarily from intentional mechanisms such as fans
- Infiltration is random, depending on outdoor conditions

Infiltration



Infiltration

- When we say a house has “0.35 ACH” we mean that as a seasonal or annual average
  - A lot more when outdoor conditions are more severe
  - A lot less when outdoor conditions are more mild

Infiltration

- People ask: why tighten and then put in a fan?
  - Airflow rates LOWER when temperatures colder and more expensive to heat
  - Airflow rates may be HIGHER when temperatures warmer
  - With efficient fans, total cost can be lower while also providing better IAQ

Infiltration

- Blower door doesn’t measure infiltration, only airtightness
- Annual average infiltration rates estimated from
  - Airtightness
  - Climate
  - House height and shielding
- Estimates uncertain by a factor of 2 or more

Infiltration

- ACH50/20? (or 27?)
- Standard 119 calculates normalized leakage from
  - blower door reading
  - floor area
  - height
- Standard 136 estimates infiltration from normalized leakage and weather factor
  - weather factor for geographical location

Windows?

- Standard 62 allowed windows to be used towards meeting required rate
- Requires people to open them
  - Studies showing that window use is erratic

- Standard 62.2 (and a growing number of codes) does not allow windows to count
  - Will discuss exception later

Standard 62.2 Fan Requirements

- Whole-House ventilation

- Bath Fans
- Kitchen Fans

} Both count toward whole-house rate

- Can choose continuous or intermittent

Spot Exhaust Ventilation

- Bathrooms (not half bathrooms)
  - 50 CFM on-demand, or
  - 20 CFM continuous.

- Kitchen
  - 100 CFM on-demand, or
  - 5 ACH continuous, based on kitchen volume.

Whole-house ventilation

Floor Area (ft^2)	Bedrooms					
	0-1	**2-3**	**4-5**	**6-7**	**>7**	
<1500	30	45	60	75	90	
1501-3000	45	60	75	90	105	
3001-4500	60	75	90	105	120	
4501-6000	75	90	105	120	135	
6001-7500	90	105	120	135	150	
>7500	105	120	135	150	165	

Whole-house ventilation

- Mechanical rate = 7.5*NP + 0.01*Afloor
  - NP default is number of bedrooms + 1
  - Use actual occupancy if higher
  - Assumes infiltration rate of 0.02*Afloor

- No differentiation between mechanical ventilation system types

Whole-house ventilation

- Equation and table assume continuous
- If intermittent, may need to increase size of fan by as much as a factor of 4
  - Current table in Addendum b, available on ASHRAE website
- No increase if runs once in 6 hours*

*see next slide

Correction to intermittent fan rates

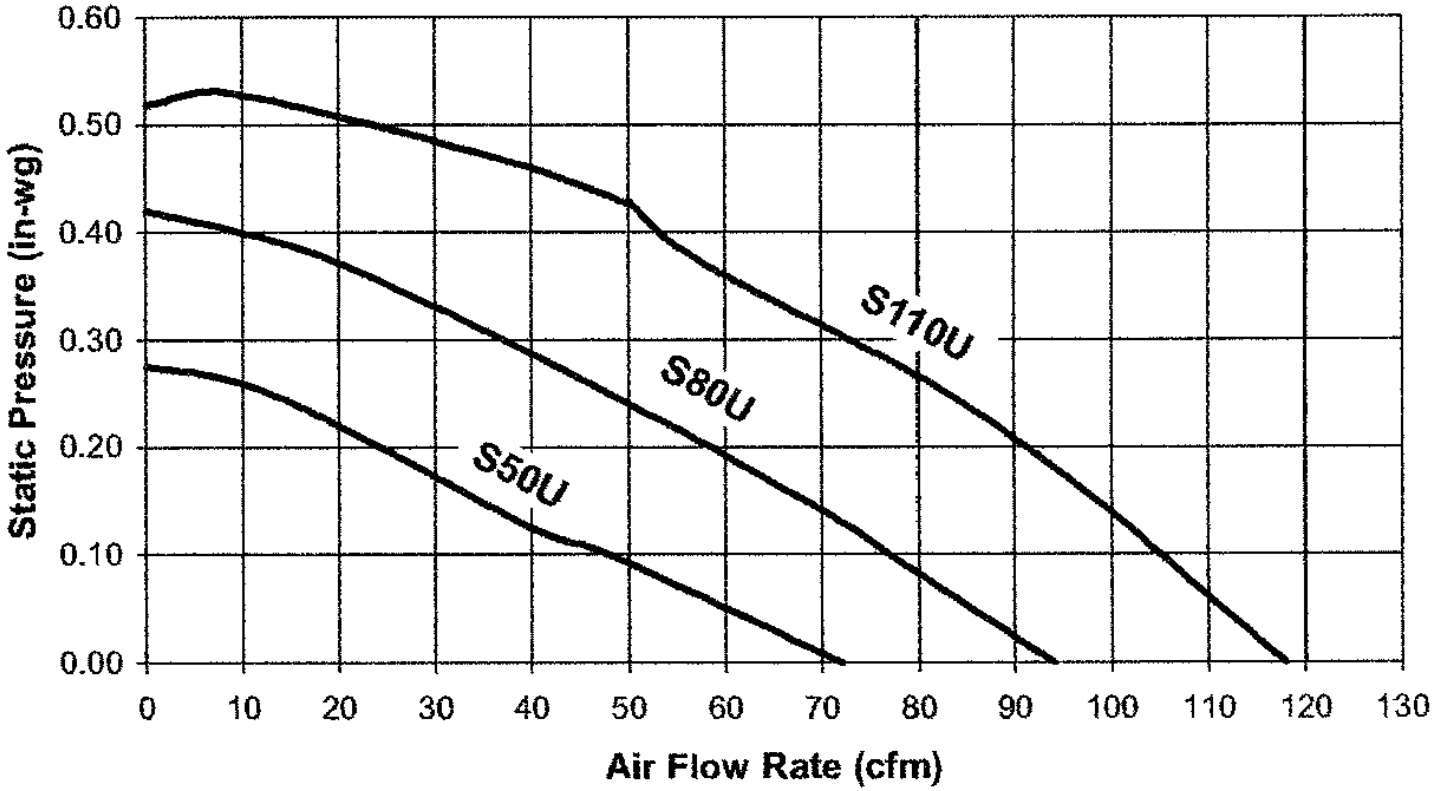
- In this presentation I show that Std. 62.2 says that there is no additional increase in fan capacity beyond the fractional runtime if the fan runs at least 1 time in 6 hours. Immediately following the presentation I received an e-mail stating that there was an error in that calculation and that the new table in Addendum b would be revised. This will result in the frequency of required fan operation changing to 1 time in 4 hours to avoid additional fan capacity requirements. This impacts the previous slide as well as those comparing Stds. 62 and 62.2 later.

Ventilation System Specs

- Noise
  - Continuous fans: maximum 1 sone
  - Intermittent fans: maximum 3 sones

Ventilation System Specs

- Flow verification
  - Fan flow must be measured, or use flow at **0.25 in-wc** (fans rated at **0.10 in-wc**) if ducting meets specs



Add increasing resistance
on y axis

Ventilation System Specs

- Ducting requirements if rating at **0.25 in-wc** to be used

Duct Type	**Flex Duct**				**Smooth Duct**			
Fan Rating CFM @ 0.25 in. wg	50	80	100	125	50	80	100	125
Diameter (in)	**Maximum Length (ft)**							
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

- Table assumes no bends – deduct 15’ for each elbow

X – not allowed

NL – no limit

Ventilation System Specs

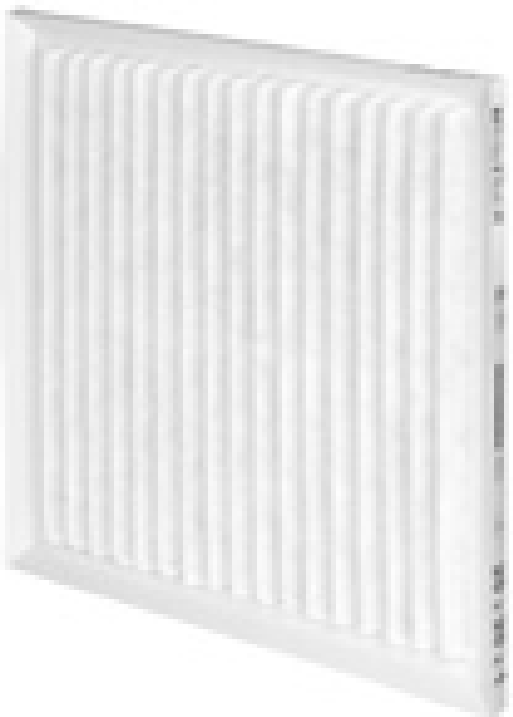
- Fans must be ducted to outside

NO

YES

Ventilation System Specs

- Filtration
  - If forced-air system used to distribute ventilation air, must use MERV 6 or better filter



Other Considerations in 62.2

- Transfer Air
  - Ventilation air should come directly from outside
  - Efforts should be taken to prevent migration of air from other spaces

Other Considerations in 62.2

- Dryers
  - Vented to outside
  - Unless condensing, then plumb to drain

Other Considerations in 62.2

- Attached garages
  - Should be sealed from the house
  - If there is ducting in the garage then the entire duct system must not have CFM25 leakage (i.e. using a Duct Blaster) greater than 6% of air handler flow

Other Considerations in 62.2

- Maximum exhaust
  - If natural-draft combustion appliances within pressure boundary, two largest exhausts can't exceed 15 cfm/100 sq. ft. at maximum flow
    - 150 cfm for 1000 sq. ft. house
    - 225 cfm for 1500 sq. ft. house

Other Considerations in 62.2

- Air inlets as part of the ventilation system
  - Remote from sources of contamination
  - Won’t get obstructed from outside
  - Provided with screens

Existing Buildings

- Special Considerations for
  - Homes built before adoption of 62.2 (infiltration credit)
  - Kitchens and bathrooms not being renovated (new appendix)

Infiltration Credit

- IF
  - House built before adoption of 62.2
  - Blower door test done
  - Estimated infiltration using Standard 136 is greater than 2 cfm/100 sq. ft.
- THEN
  - Reduce whole-house rate by ½ of the excess above 2 cfm/100 sq. ft.

Infiltration Credit

- Example #1
  - 3 BR house, 1500 sq. ft.
    - Requires 45 cfm mechanical
    - Assumes 30 cfm natural (0.02 * 1500)
  - Blower door reading leads to estimated infiltration of 70 cfm
  - Reduce mechanical by ½(70-30) = 20
  - Now need 45-20 = 25 cfm whole-house

Infiltration Credit

- Example #2
  - 3 BR house, 1500 sq. ft.
    - Requires 45 cfm mechanical
    - Assumes 30 cfm natural (0.02 * 1500)
  - Blower door reading leads to estimated infiltration of 120 cfm
  - Reduce mechanical by ½(120-30) = 45
  - Now do not need to install whole-house ventilation

Infiltration Credit

- Example #3
  - 3 BR house, 1500 sq. ft.
    - Requires 45 cfm mechanical
    - Assumes 30 cfm natural (0.02 * 1500)
  - Blower door reading leads to estimated infiltration of 20 cfm
  - Since 20 is less than 30, no change
  - Still need 45 cfm whole-house

Comparison of 62 and 62.2

Example 1

House of 1000 ft^2
3 bedrooms (4 occ.)
CFM_{50} = 1200
Weather factor = 0.78

ASHRAE 62 – 2001
BTL = 1110 CFM_{50}
BTLa = 1415 CFM_{50}
Cont. Vent = 18 CFM

ASHRAE 62.2 – 2007
Threshold = 2359 CFM_{50}
Cont. Vent = 25 CFM
50% Vent = 50 CFM*

* If runs once in 6 hours; once a day need 67 CFM

Courtesy: Rick Karg

Comparison of 62 and 62.2

Example 2

House of 2000 ft^2
3 bedrooms (4 occ.)
CFM_{50} = 1300
Weather factor = 0.78

ASHRAE 62 – 2001
BTL = 1381 CFM_{50}
BTLa = 1912 CFM_{50}
Cont. Vent = 60 CFM

ASHRAE 62.2 – 2007
Threshold = 2872 CFM_{50}
Cont. Vent = 38 CFM
50% Vent = 76 CFM*

* If runs once in 6 hours; once a day need 101 CFM

Courtesy: Rick Karg

Comparison of 62 and 62.2

Example 3

House of 2400 ft^2
4 bedrooms (5 occ.)
CFM_{50} = 1600
Weather factor = 0.78

ASHRAE 62 – 2001
BTL = 1658 CFM_{50}
BTLa = 2294 CFM_{50}
Cont. Vent = 68 CFM

ASHRAE 62.2 – 2007
Threshold = 3503 CFM_{50}
Cont. Vent = 46 CFM
50% Vent = 92 CFM*

* If runs once in 6 hours; once a day need 123 CFM

Courtesy: Rick Karg

Comparison of 62 and 62.2

Example 4
(same as #3 but looser)

House of 2400 ft^2
4 bedrooms (5 occ.)
CFM_{50} = 2294
Weather factor = 0.78

ASHRAE 62 – 2001
BTL = 1658 CFM_{50}
BTLa = 2294 CFM_{50}
Cont. Vent = 0 CFM

ASHRAE 62.2 – 2007
Threshold = 3503 CFM_{50}
Cont. Vent = 30 CFM
50% Vent = 60 CFM*

* If runs once in 6 hours; once a day need 80 CFM

Courtesy: Rick Karg

Field Experience

- Wisconsin weatherization has applied 62.2 to nearly 30,000 homes
- More fans put in
- Smaller fans than required by 62-2001

New Appendix

- Meeting 62.2 can be challenging in existing homes
  - Budget small compared to new construction
  - Spot ventilation requirements can be very costly
    - About $500 for a bathroom fan if none exists
    - Kitchen fans prohibitive

New Appendix

- Alternate spot ventilation compliance path for homes where major renovation is not planned
  - Weatherization is prime example
- If fans are being installed, or if major renovation of kitchens & baths is planned, then appendix doesn’t apply

New Appendix

- In each room where spot ventilation should be, determine deficit relative to intermittent rate
  - How much less than 50 cfm in bathrooms
  - How much less than 100 cfm in kitchens
- For each room with a deficit, reduce room's deficit by 20 cfm if that room has an operable window

New Appendix

- Add up deficits, *divide by 4*
- Add the result to the whole-house requirement
  - This becomes the new whole-house requirement

New Appendix

- Note that if whole-house fan is added to a room that should have spot ventilation (e.g. a bath fan) then this will reduce the deficit in that room

New Appendix

- For existing fans being used, sound and ducting requirements not applicable
- Must measure flow if ratings don’t exist or duct sizing can’t be verified
  - If only have rating at 0.10 in. wc but not 0.25 in. wc, can reduce rating at 0.10 in. wc by 25%

New Appendix

- Example #1
  - 1500 sq. ft. house, 3 bedrooms
  - 2 bathrooms, one kitchen, no mechanical ventilation exists, no windows in kitchen or baths
  - Deficit is 200 CFM (100 for the kitchen, 50 for each bath)
  - Whole-house requires 45 + 200/4 = 95

New Appendix

- Example #2
  - Same house, but windows in one bath and the kitchen
  - Deficit is 80 for the kitchen, 30 for the bath with a window, and 50 for the other bath, total of 160
  - Whole-house requires 45 + 160/4 = 85 cfm

New Appendix

- Example #3
  - Same house as example #2, but the bath without a window has a fan moving 32 cfm
  - Deficit is 80 for the kitchen, 30 for the bath with a window, and 18 for the other bath, total of 130
  - Whole-house requires 45 + 132/4 = 77 cfm

New Appendix

- Example #4
  - Same house as example #3, but fan put in bath without any fan but with a window
  - If fan is bigger than 50 cfm, no more deficit in that room
  - Total deficit now 80 cfm for kicthen and 18 cfm for other bathroom, total 98 cfm
  - Whole-house (in bath) requires 45 + 98/4 = 70 cfm

Impact on Weatherization

- More fans installed, smaller when needed
- New appendix allows 62.2 to be met with one fan
- Wisconsin has developed suggested work flow

Wisconsin suggested work flow

- Estimate post-wx CFM50
- If expect to need a fan, size according to Std. 62.2
  - Maximum size you might need
- Following wx, set fan to flow required based on actual CFM50
- Perform combustion safety test