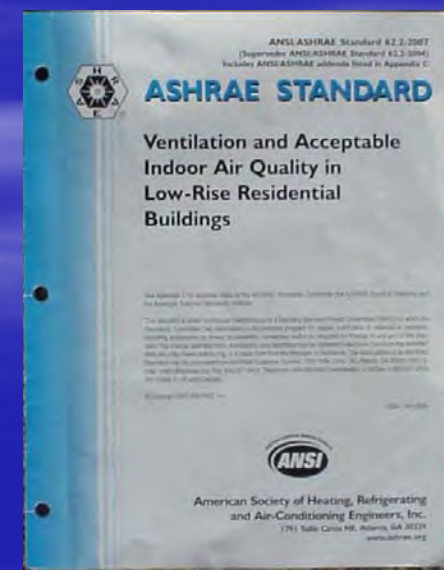




# HVI Ventilation Track Session 4

Don Stevens  
ComforTech 2008  
Atlanta



# Don T. Stevens

- National Research & Development Manager, Panasonic Home & Environment Company
- Voting Member, SPC 62.2 and SSPC 62.2
- Vice-Chair, SSPC 62.2
- Past Chair, Home Ventilating Institute (HVI)
- Consultant to ventilation manufacturers, utilities, and agencies on codes, standards, and product development 1983-2007
- Participant in development of ventilation codes nationally since 1984

# Building and Ventilation Codes

## Ventilation Rates

## Certified Performance

Q&A

# Ventilation Codes

- IRC-2006
- Washington State VIAQ 1991/2006
- Minnesota Energy Code 1998/2006
- California Title 24 2008



# Ventilation Codes

- IRC-2006
  - Residential one and two family
  - Adopted in many states
  - Requires whole house ventilation at 0.35 ACH but can be met with windows
  - Requires bath fans only if no operable window
  - Requires kitchen ventilation if no operable window

# Ventilation Codes

- Washington State Ventilation and Indoor Air Quality Code (VIAQ)
  - Adopted first in 1990
  - Updated to current 2006 version
  - Requires mechanical whole house ventilation at least eight hours a day with 1.5 sones max fan or remote fan or airhandler
  - Requires bath fans and range hoods

# Ventilation Codes

- Minnesota Energy Code
  - First adopted in 1997 and updated several times
  - Requires mechanical ventilation, generally with tempering because of extreme climate
  - Stringent limits on depressurization because of combustion safety
  - Limits primary IAQ fans to 1.5 sones

# Ventilation Codes

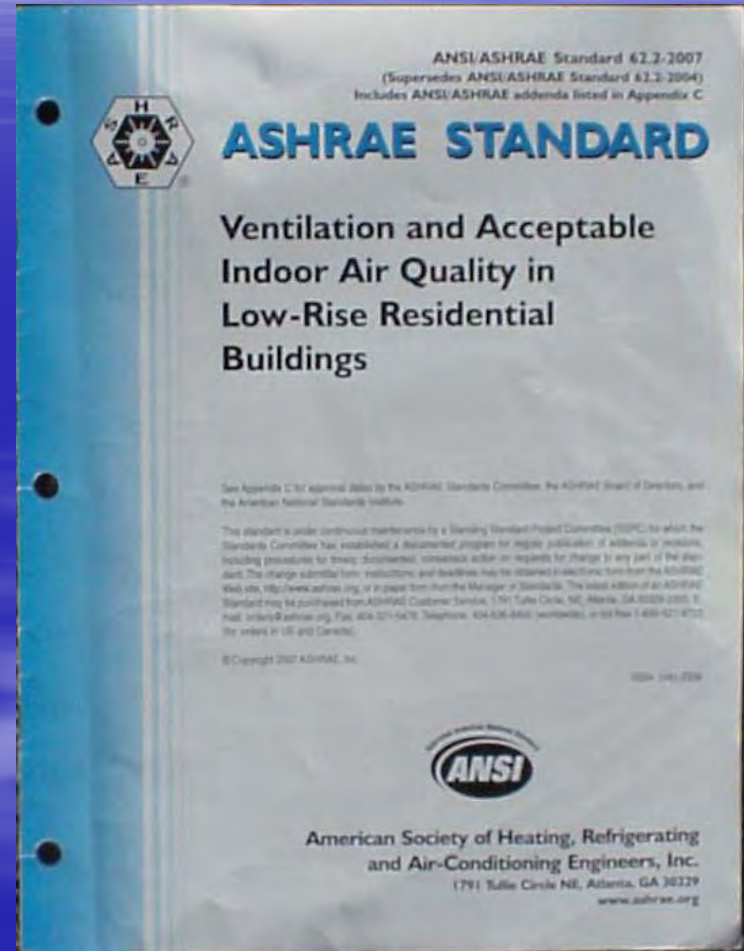
- California Title 24
  - California Energy Commission adopted ASHRAE 62.2-2007 as ventilation requirement
  - Effective date in 2009 when training materials are in place





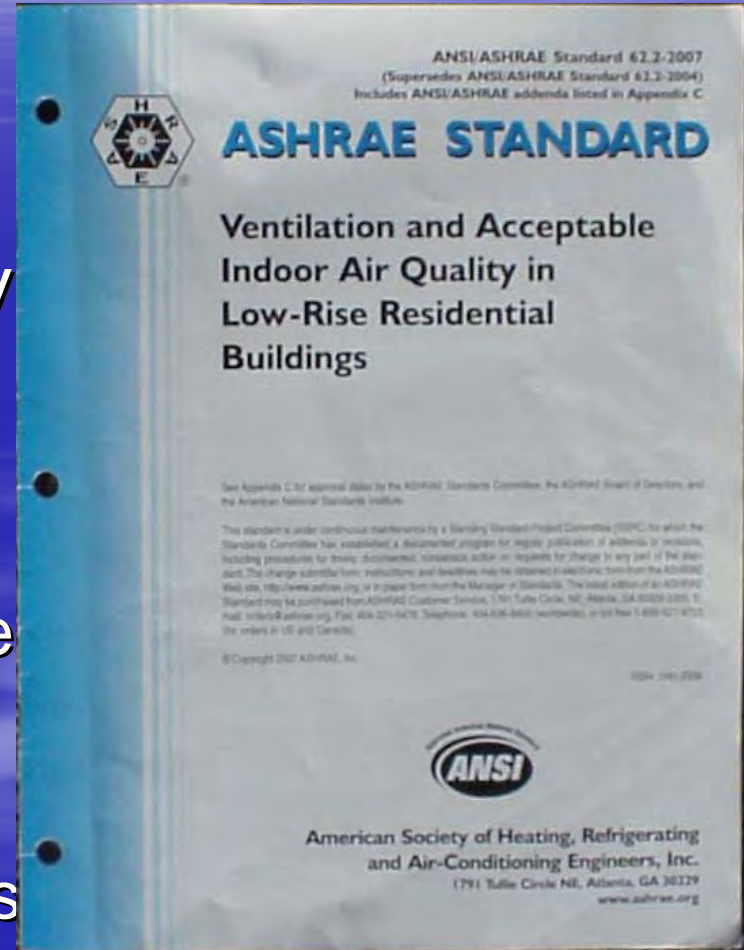
# Background (cont)

- SSPC 62.2
  - Formed in January, 2004 for continuous maintenance of “high profile” standard
  - 62.2 is the only national standard of design for ventilation professionals and engineers



# Background (cont)

- ASHRAE 62.2
  - Basis for ventilation requirements for virtually all the “Green Building” programs nationally
    - LEED for Homes
    - Energy Star IAQ Package
    - RESNET ratings
    - NAHB Green Standard
    - Numerous state programs
    - Most weatherization programs



# Requirements of ANSI/ASHRAE 62.2-2007

- Scope
- Definitions
- Whole Building Ventilation
- Local Exhaust
- Other Requirements
- Air-Moving Equipment
- Venting of Combustion Appliances
- Operations and Maintenance

# Whole Building Ventilation Requirements for General IAQ

- Covered in Section 4, pages 4 & 5
- Applies to all low-rise residential single family and multifamily buildings.
- Exemption to mechanical IAQ ventilation for limited situations.
- Sound rating of 1.0 sones or less is required for exposed whole building ventilation fans.

# Whole Building Ventilation Requirements (cont)

- Sizing Table 4.1a is provided based on 7.5 cfm/person plus 1 cfm/100 ft<sup>2</sup> of conditioned space.
- 62.2-2007 assumes 2 people in the master bedroom like ASHRAE 62-1989.
- Table 4.1a reduces ventilation of larger residences compared to old 0.35 ACH method.

# Whole Building Ventilation Requirements (cont) Table 4.1a (cfm)

Number of Bedrooms	0-1	2-3	4-5	6-7	>7
<1500 ft <sup>2</sup>	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 ft <sup>2</sup>	105	120	135	150	165

# Whole Building Ventilation Requirements (cont)

- This level of ventilation is intended to be provided continuously whenever the building is occupiable.
- This can be supply ventilation, exhaust ventilation, or balanced ventilation.
- This level of ventilation was set including a default credit of 1 cfm/100 ft<sup>2</sup> for infiltration.
- However, all houses and units, new and existing, require mechanical ventilation because we cannot depend on infiltration.



# Local Exhaust Requirements

- Covered in Section 5 on page 5.
- ASHRAE 62.2-2007 addresses commonly-occurring IAQ sources through local ventilation in baths and kitchens.
- Bathroom ventilation can operate intermittently at a minimum of 50 cfm or continuously at a minimum of 20 cfm, the same as 62-1989.

# Local Exhaust Requirements (cont)

- Bath fans must meet the design airflow either through on-site testing or using their certified rated flow at 0.25" water column.
- Bath fans must be rated at 3.0 sones or less or be replaced by a pickup grille for a remote fan.
- Many bath fans will meet this sound requirement, but providing the required flow at 0.25" w.c. is much more difficult.

# Local Exhaust Requirements (cont)

- Mechanical kitchen ventilation must be provided by a range hood, a microwave/hood combination, a downdraft fan, a kitchen ceiling or wall fan, or a pickup grille for a remote fan.
- The fan must remove at least 100 cfm if operated intermittently by the occupant or at least five air changes per hour (ACH) if operated continuously.

# Local Exhaust Requirements (cont)

- The range hood or microwave/hood combination must be rated at 3.0 sones or less at the minimum flow of 100 cfm.
- Other kitchen exhaust fans must be rated at 3.0 sones or less at their required flow unless over 400 cfm.
- Kitchen fans must meet the design airflow either through on-site testing or using their certified rated flow at 0.25" water column.

# Other Requirements in 62-2-2007

- Transfer Air
- Instructions and Labeling
- Combustion Appliances
  - 15 cfm/100 sq ft max
- Garages
- Minimum Filtration
  - MERV 6 filter required if over 10' of supply duct and a thermal conditioning element
- Ventilation Openings

# Air-Moving Equipment Requirements

- Ventilation devices must be selected using tested and certified ratings of performance for both airflow and sound in accordance with HVI procedures.
  - HVI Certified Products Directory ([www.hvi.org](http://www.hvi.org) )
  - Continuous fans rated 1.0 sones or less (over 400 listings available)
  - Intermittent kitchen fans rated at 3.0 sones or less at the minimum operating airflow of 100 cfm (400 cfm max)

# Design Examples For Meeting ANSI/ASHRAE 62.2-2007

- Whole Building IAQ Ventilation Examples
  - Continuous Ventilation Approaches
  - Timer-Based Ventilation Approaches
  - Climate Impacts on System Selection
- Local Exhaust Ventilation Examples
  - Kitchen Ventilation
  - Bathroom Ventilation
  - Other Room Ventilation

# Whole Building IAQ Ventilation Examples

- 2,400 ft<sup>2</sup> 3 bedroom house
  - Can calculate or use Table 4.1a
  - 3 bedrooms assumes 4 occupants
  - $(4 \text{ occupants} \times 7.5 \text{ cfm/occ}) + (2400 \text{ ft}^2 \times 1/100 \text{ ft}^2)$   
= **54 cfm** required flow
  - Using Table 4.1a, go across table at 1500-3000 ft<sup>2</sup> and down from 2-3 bedrooms = **60 cfm** required flow



# Whole Building Ventilation Requirements (cont) Table 4.1a (cfm)

Number of Bedrooms	0-1	2-3	4-5	6-7	>7
<1500 ft <sup>2</sup>	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 ft <sup>2</sup>	105	120	135	150	165

# Whole Building IAQ Ventilation Examples (cont)

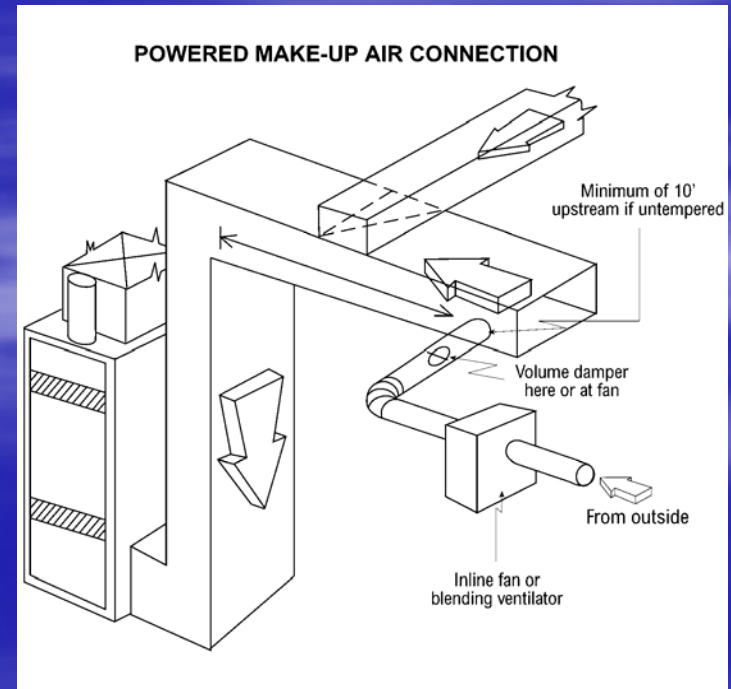
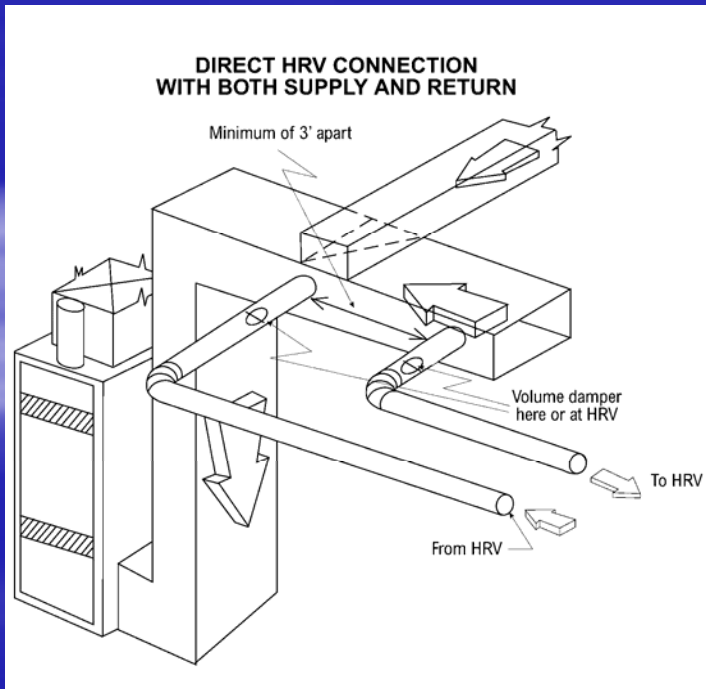
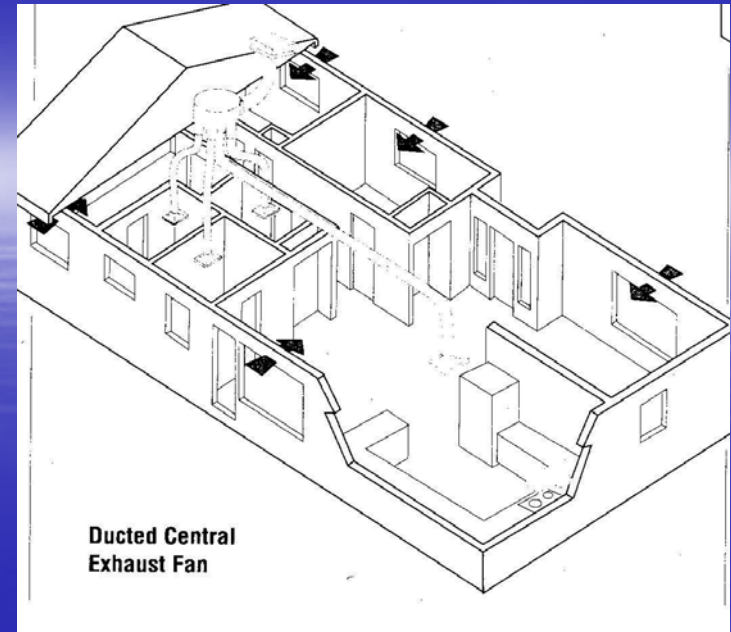
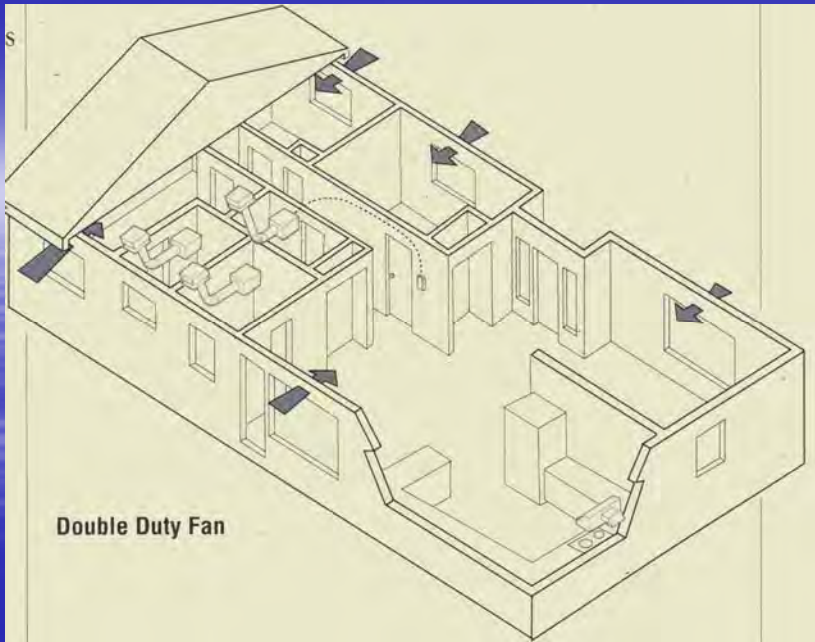
- 800 ft<sup>2</sup> two bedroom apartment
  - 2 bedrooms assumes 3 occupants
  - $(3 \text{ occupants} \times 7.5 \text{ cfm/occ}) + (800 \text{ ft}^2 \times 1/100 \text{ ft}^2)$   
= **31 cfm** required flow
  - Using Table 4.1a, go across table at <1500 ft<sup>2</sup> and down from 2-3 bedrooms = **45 cfm** required flow

# Whole Building Ventilation Requirements (cont) Table 4.1a (cfm)

Number of Bedrooms	0-1	2-3	4-5	6-7	>7
<1500 ft <sup>2</sup>	30	45	60	75	90
1501-3000	45	60	75	90	105
3001-4500	60	75	90	105	120
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>7500 ft <sup>2</sup>	105	120	135	150	165

# Continuous Ventilation Approaches

- Section 4.2 allows supply, exhaust, or balanced flow to ensure that the above amount of outdoor air is introduced into the house or apartment
- No specific requirement for distribution to every room, but some concern



# Performance Testing and Certification

- Home Ventilating Institute
  - Ventilation Industry Trade Association
  - 95%+ of North American products
  - Airflow and sound testing
  - Certification program
  - Certified Product Directory
  - [www.hvi.org](http://www.hvi.org)
  - 1-847-526-2010

# Testing and Certification at HVI

- Testing done at third party labs:
  - Energy Systems Lab (ESL) at Texas A&M University in College Station, TX
    - All fan products down to less than 0.3 sones
  - AMCA Lab in Arlington Heights, IL
    - All fan products down to 1.5 sones
  - Bodycote Lab in Mississauga, Ontario
    - HRV and ERV products

# Testing and Certification (cont.)

- Fans are mounted on a stand for airflow testing
- A calibrated airflow test chamber is used





# Testing and Certification (cont.)

- Fan airflow is monitored automatically by the ESL technician
- Measurements are taken at a variety of pressures from 0" w.c. to shutoff of fan at 0.4-0.8" w.c.



# Testing and Certification (cont.)

- Sound testing is done in a certified sound chamber
- A rotating microphone is used to measure sound power at 24 frequencies
- Sound room is concrete double-wall, isolated from the rest of lab, and “floats” on rubber cushions or sand



# Testing and Certification (cont.)

- Sound measurements are collected by computer software
- Measurement of background noise and a standard Reference Sound Source are taken
- Computer compares sound pressure level at 24 frequencies and calculates linear sound level in sones

# Testing and Certification (cont.)

- The final airflow and sound ratings are submitted by the manufacturer for certification by HVI
- HVI staff verifies test results and certifies
- HVI publishes certified results on HVI web site ([www.hvi.org](http://www.hvi.org)) and updates monthly
- HVI provides annual verification testing to ensure manufacturer honesty in manufacturing and performance claims
- HVI listings are the basis of Energy Star listing

# Why use certified products?

- Certified performance from HVI is the best way to ensure expected performance in the field.
- US and Canadian building codes **require** HVI Certified Performance ratings when using prescriptive compliance methods to avoid field testing.
- Data on about 2,500 products is available at [www.hvi.org](http://www.hvi.org)

# Questions? Don Stevens



Panasonic Home and Environment  
Company

PO Box 398

Keyport, WA 98345

360-908-7132

[stevensd@us.panasonic.com](mailto:stevensd@us.panasonic.com)