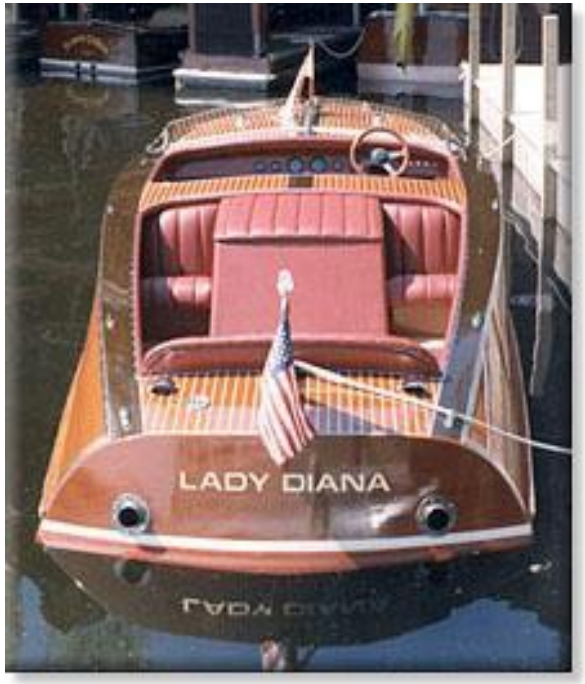
Residential Ventilation

Monroe County
Fire Marshalls and Inspectors Conference
W. Webster, NY
Course #T02-07-2841
August 2021

Mike DeWein
North Branch Services

North Branch Services

Where I Come From…



NEW ENERGY STORE

ALLIANCE TO SAVE ENERGY

Using less. Doing more.

New York State Energy Office

Committees Past & Present

- ICC SEHPCAC
- ASHRAE 189
- ICC 700
- USGBC – IAQ
- NYS-DOS Energy Code

Before…?

Who Remembers this?

NEW YORK STATE ENERGY OFFICE

ENERGY CODE Tech Notes

Mario M. Cuomo
Governor

October 1987

William D. Cotter
Commissioner

Welcome to the first issue of Energy Code TECH NOTES. Many of you have indicated a need for more information on the New York State Energy Code. Others have requested a forum to exchange ideas and experiences and to ask questions.

TECH NOTES should do this and more. It deals with the Energy Code and the Energy Law in a straightforward manner.

We encourage you to send us your questions and comments. Any problems you are experiencing are probably shared by others. No names will be used in letters printed here, unless you request otherwise. See the last page for our mailing address.

Our goal with TECH NOTES is to improve everyone's understanding of energy and the Energy Code. To that end, we're sending TECH NOTES to code enforcement officials, architects, engineers and builders.

...On U Values

Q *I work in a 5000 degree-day zone. The U value required for walls in a non-electric comfort heated home under Part 4 is .18, but under Part 5 it is .05. Since the lower the U value, the more insulation is required, why is there such a big difference in the two Parts?*

A The U values listed for walls in Part 5 are for the opaque wall section only. Part 4, however, lists **overall** U values for walls that include the opaque section, **glazing and doors**. The U values for glazing and doors are high (poor insulators) and, therefore, raise the overall U value for walls listed in Part 4.

...Want a Seminar?

Q *It would be beneficial to have someone from the Energy Office speak to our organization about the Energy Code. What is the procedure for requesting such a seminar?*

A An Energy Code workshop can easily be arranged by sending a written request to our Codes and Standards Bureau. Please advise us of the makeup of the group (size, background, etc.). Also, we need a contact person and phone number. It's a good idea to give us first and second choice dates, and we would appreciate at least three weeks lead time on all workshop requests.

...Official Interpretations

Q *I am an upstate code enforcement official. I'm having a disagreement with a builder about the correct interpretation of a section of the Energy Code. Is there an official interpretation procedure available through the State Energy Office to solve our problem?*

A Section 7810.17 of the Energy Code provides for an official interpretation procedure through the Energy Office. A request for an interpretation may be submitted by either the permit applicant or the code enforcement official to the Codes and Standards Bureau. Specific information (listed in 7810.17) must be included in the request. An official interpretation is legally binding and valid only for that project.

...Log Homes and "Thermal Mass"

Q *Lately, I've been getting a lot of building permit applications for log homes. Are they required to meet the Energy Code? If so, are there there any log homes which can meet the Code? When I asked a dealer about complying, he said there was enough "thermal mass" in the logs to retain a substantial amount of heat, so additional insulation is not required. What is "thermal mass" and can it be used instead of insulation?*

A Many log homes can meet the Energy Code, however, the Energy Office does not recognize the use of thermal mass as a means of compliance. Log homes are treated the same as any other home by the Code. The term "thermal mass" (or "mass effect") relates to the phenomenon where heat transfer through the walls is delayed by the ability of the wall mass to retain heat. This concept works well in mild climates such as Washington, D.C., but not in cold climates like New York. The National Bureau of Standards (NBS) has studied the thermal mass effects of log homes and concluded that "walls of heavyweight construction...exhibit an energy-conserving mass effect... during the summer and the intermediate heating season representative of fall or spring in a moderate climate. However, no mass effect was observed during the winter heating season".

Objectives of this Course

- Review the requirements for residential ventilation in NYS Code
- See how those requirements are currently being interpreted
- Review why we need ventilation in homes and buildings
- Understand the fundamentals of ASHRAE 62.2 – 2010, 62.2 – 2013 & ASHRAE 62.2 – 2016, and how they relate to code
- Understand the difference in Whole-Building (House) ventilation, intermittent Whole-Building ventilation and Spot ventilation
- Evaluate the differences in Exhaust, Supply and Balanced ventilation options to meet NY Code requirements
- Compute the proper ventilation system size in a residence
- Apply some fundamentals when installing ventilation fans

Agenda

- Current NY Residential ventilation requirements
- How they are being interpreted
- Why we need to ventilate?
- Reviewing different approaches to ventilation – NY homes
- ASHRAE Standard: 2010, 2013, and 2016
- Meeting Standard: Exhaust, Supply and Balanced
- Source, or 'Spot' Ventilation Requirements
- Calculating the 2010, 2013 and 2016 Standard
- Installation Techniques

NYS Residential Code Ventilation Requirements

- Primarily in IRCNYS-2020 and ECCCNYS – 2020
- Energy Code requires efficient, quiet fans capable of 100% run time
- Res Code – covered in Sec 1505 Mech. Ventilation
- Energy Code – fan efficacy covered in Sec R403.6
- Does NOT reference ASHRAE 62.2, BUT
- Based on 62.2, various versions

NYS Residential Code Ventilation Requirements…

ECCCNYS–2020 requires Sec R403.6 & Table)

- **Fans must be energy efficient**
- **Whole-house mechanical ventilation system**

RCNYS-2020 – Sec. 1505 & Tables

- **Whole-house mechanical ventilation system**
- **CAN be exhaust-only, supply-only, or balanced**
- ***IMPLIED that makeup air be supplied***
- **Bath Fans CAN be part of the system for exhaust**
- **Must have automatic control with accessible shutoff**
- **Can be operated full time or intermittently**

NYS Residential Code Ventilation Requirements…

Whole-house mechanical ventilation system

"An exhaust system, supply system, or combination thereof that is designed to mechanically exchange indoor air for outdoor air where operating continuously or through a programmed intermittent schedule to satisfy the whole-house ventilation rate."

FIRST implication that makeup needed – "exchange indoor air for outdoor…"

NYS Residential Code Ventilation Requirements…

CAN be exhaust-only, supply-only, or balanced

Exhaust Only

- **Can use a bath or other fan as part of the system**
- **Must have an accessible override to go to full on (during times of high moisture) or off**
- **Can be run intermittently per Residential code criteria**
- **Automatic Control**
  - **Timer, Programmable, Humidistat**

Supply Only

- **Ditto above except supply to some general area of house (not bath)**
- **Usually supplied to basement near HVAC/DHW appliances**

NYS Residential Code Ventilation Requirements…

Sec. R303.4 Mechanical ventilation.

Where the air infiltration rate of a dwelling unit is 5 air changes per hour or less… (tested to RCNYS-2020 or ECCCNYS-2020 to 3ACH502) the dwelling unit shall be provided with *whole-house mechanical ventilation in accordance with Section M1504.4*

NYS Residential Code Ventilation Requirements…

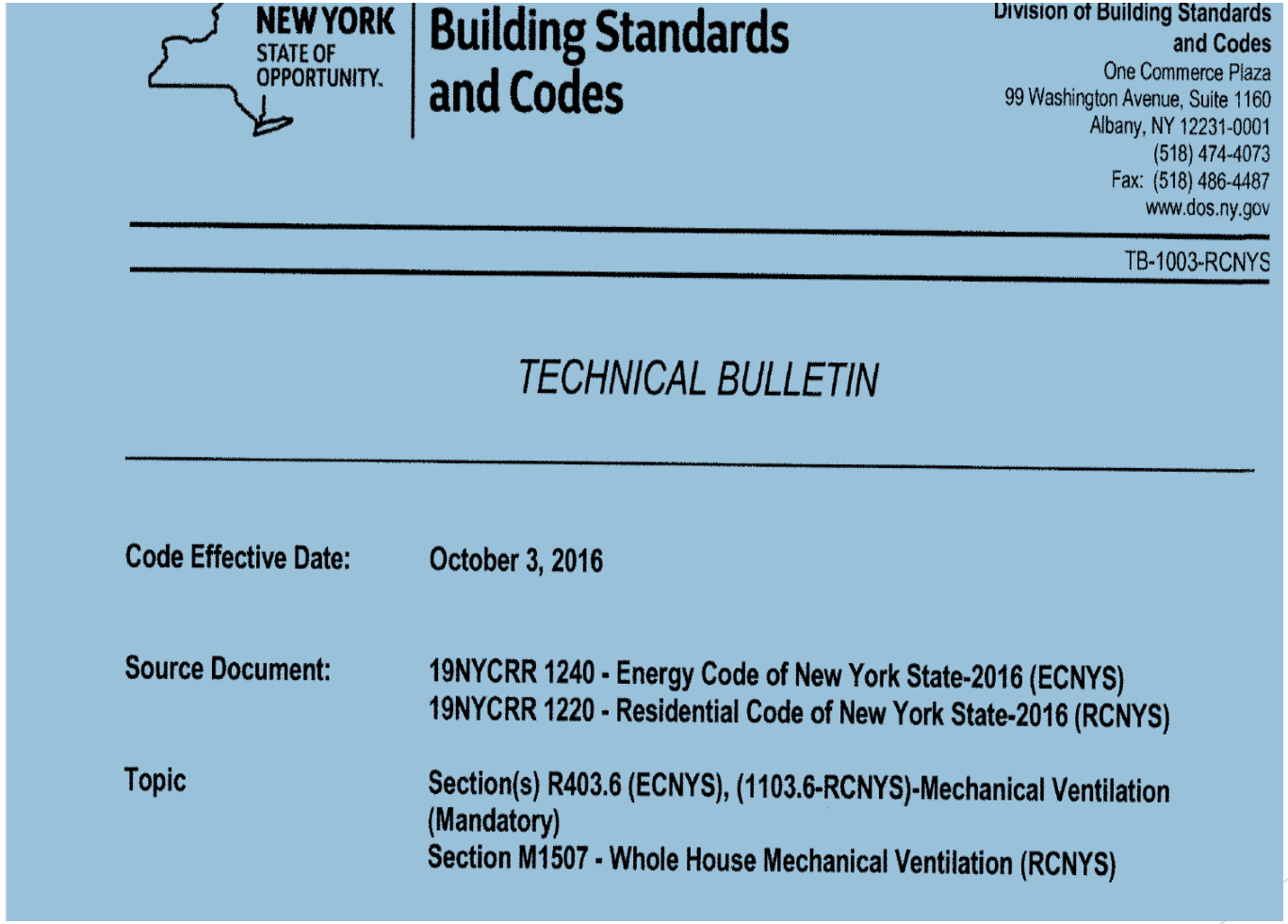
Balanced

- **Can use a bath or other fan as part of the system**
- **Must have an accessible override to go to full on (during times of high moisture) or off**
- **Can be run intermittently per Residential code criteria**
- **Automatic Control**
  - **Timer, Programmable, Humidistat**
- **MAKEUP Air of the same flow as the exhaust, controlled automatically with the exhaust**

AND…

- ***Can be connected to the return on an air system for distribution***
- ***Many E-Star Homes have used passive makeup air systems with barometric dampers***

NYS Residential Code Ventilation Requirements… Technical Bulletin



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TB-1003-RCNYS

TECHNICAL BULLETIN

Code Effective Date:	October 3, 2016
Source Document:	19NYCRR 1240 - Energy Code of New York State-2016 (ECNYS) 19NYCRR 1220 - Residential Code of New York State-2016 (RCNYS)
Topic	Section(s) R403.6 (ECNYS), (1103.6-RCNYS)-Mechanical Ventilation (Mandatory) Section M1507 - Whole House Mechanical Ventilation (RCNYS)

RCNYS – Required Minimum Mechanical Exhaust Flow Rate Table M1505.4.4

	Continuous		Intermittent
Kitchen	25 ach		100 CFM
Bathroom	20 CFM		50 CFM

- **Continuous ventilation fans must have no greater than 1 sone**
- **Spot or switch controlled ventilation fans must have no greater than 3 sone**
- **ach = air changes per hour,**
- **Flow rate (CFM) = volume x 5 / 60**

NYS Residential Code Ventilation Requirements… Technical Bulletin – KEY Code Sections…

M1505.4.1 System Design

The whole-house ventilation system shall consist of one or more supply or exhaust fans, or a combination of such, and associated ducts and controls. Local exhaust or supply fans are permitted to serve as such a system. Outdoor air ducts connected to the return side of an air handler shall be considered as providing supply ventilation.

NYS Residential Code Ventilation Requirements…

M1505.4.2 System Controls

The whole-house mechanical ventilation system shall be provided with controls that enable manual override.

M1505.4.3 Mechanical Ventilation Rate

The whole-house mechanical ventilation system ***shall provide outdoor air at a continuous rate of not less than that determined in accordance with Table M1505.4.4.***

M1507.4

AREA TO BE EXHAUSTED	EXHAUST RATES
Kitchens	100 cfm intermittent or 25 cfm continuous
Bathrooms-Toilet Rooms	Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous

NYS Residential Code Ventilation Requirements… Technical Bulletin – KEY Code Section…

M1505.4.3(1)) CONTINUOUS WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS

Dwelling Unit Floor Area (sq. ft.)	Number of Bedrooms				
	0 – 1	2 – 3	4 – 5	6 – 7	> 7
	Airflow in CFM				
< 1,500	30	45	60	75	90
1,501 – 3,000	45	60	75	90	105
3,001 – 4,500	60	75	90	105	120
4,501 – 6,000	75	90	105	120	135
6,001 – 7,500	90	105	120	135	150
> 7,500	105	120	135	150	165

NYS Residential Code Ventilation Requirements… Technical Bulletin – KEY Code Section…

M1505.4.3(2) INTERMITTENT WHOLE-HOUSE MECHANICAL VENTILATION RATE FACTORS[a, b]

RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT	25%	33%	50%	66%	75%	100%
Factor[a]	4	3	2	1.5	1.3	1.0

a. For ventilation system run time values between those given, the factors are permitted to be determined by interpolation.

b. Extrapolation beyond the table is prohibited.

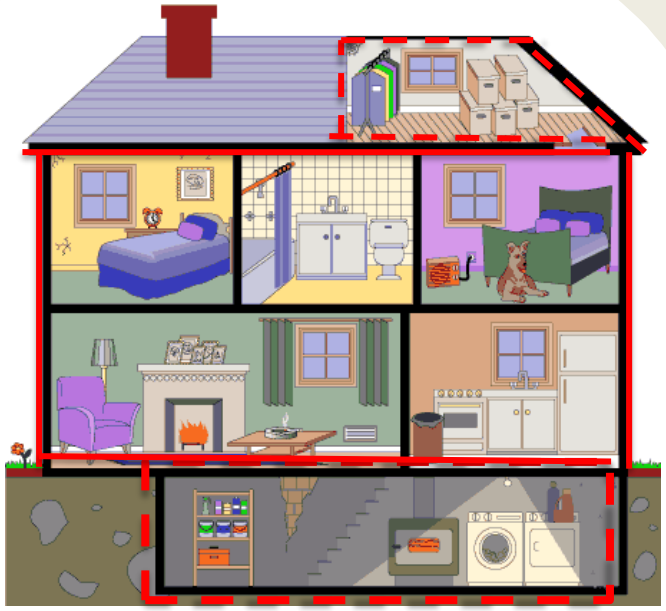
SO…Why We Need to Ventilate Homes?

http://www.energy.wsu.edu/videos/fresh-air-for-a-heathier-home_part-01/

Why Ventilate – House as a System

Envelope

Environment



Mechanical

Occupants

Home Building Changes

Envelope

- Bigger houses
- Smaller lots
- More and larger windows
- Tighter envelopes
- More insulation
- More complex roofs

Mechanicals

- High Efficiency HVAC
- More air-conditioning
- More plumbing
- More exhaust fans
- More fuel choices
- More appliances and lighting

Multifamily

Multifamily ventilation tends to be more complex

- **IAQ Issues - Air Infiltration:**
  Neighboring Units
  Garage
  Hallway/Common - Odors

- **IAQ Issues - Off Gassing:**
  Cabinets
  Carpets
  CO/Combustion
  Furniture

- **IAQ Issues – Moisture & Mold:**
  Leaks
  Humidity

Multifamily Ventilation

Multifamily ventilation is more important than ever

- Both Low rise and High rise:
  Owners are retaining ownership longer than ever.
  Less desirable land available
  Gut and rehab, very active

- IAQ Issues & Concerns:
  Building health concerns
  Isolating units from Common Building
  Extensive Air Sealing during rehab
  Meeting Fire and ventilation codes

- IAQ Issues – Water:
  Managing moisture, Mold & Mildew
  Building longevity

ASHRAE 62.2 Standard
Meet the Standard, Comply with Code

ASHRAE 62.2 Standard
How to meet the Standard

- Important – ASHRAE 62.2…
- ***NOT*** the requirement or referenced in the code
- ***IS*** the standard for design
  - Where the Code requirements come from

What Is ASHRAE?

The American Society of Heating, Refrigeration and Air Conditioning Engineers

- 62.2 The national standard for residential ventilation

  Original Residential Standard was adapted from 62.1, which is the Commercial Ventilation Standard

  The first ASHRAE Residential Standard was published in 1989

  Updated in 2003, 2007, 2010, 2013 & 2016

  - Nearly every US building program or State code defers some ASHRAE Standard
  - ASHRAE is an International organization which heavily influences building standards throughout the world
  - Concern that 2016 OVER-ventilates

Home Ventilating Institute (HVI)

- International trade association for ventilation products consisting of vent (bath) fans, range hoods, inline fans, heat & energy recovery ventilators
- Provides third-party verified performance ratings for ventilation products
- Publishes the HVI Directory which verifies manufacturers published specifications
- Although tested at 0.1 and 0.25 " of water column, 0.25 is more a reality, especially when 4" duct is employed..

Key Ventilation Technical Terms

Static Pressure

A measure of the resistance against flow as the fan pushes air through a duct. Measured in water column inch, or "inch WG"

CFM

Cubic Feet per Minute – Air flow measurement.

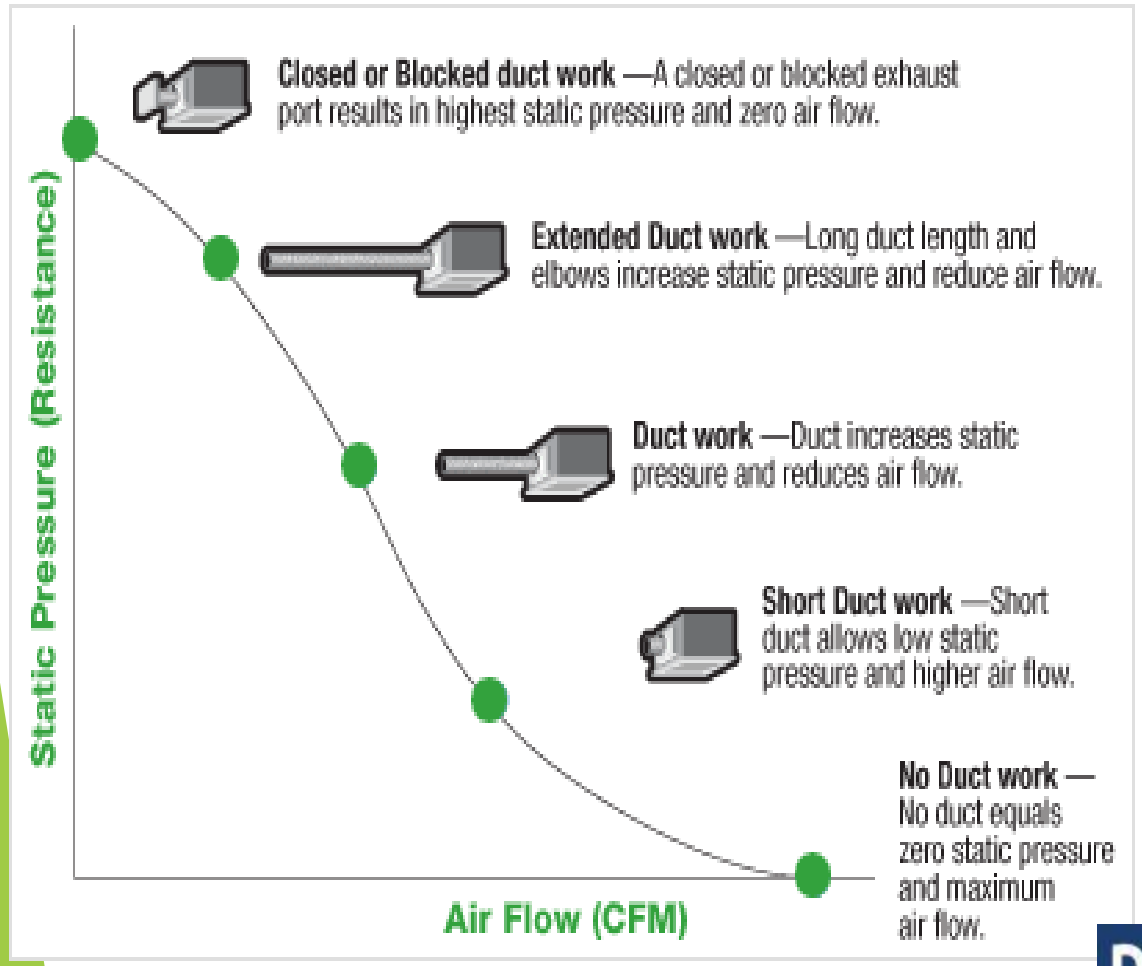
The larger the CFM, the more powerful the fan is.

Sone

An internationally recognized measurement of sound output.

The lower the sone level, the quieter the fan.

0.25”w.g. Static Pressure = “Installed Performance”



ASHRAE 62.2 – National Ventilation Standard, required by ENERGY STAR for Homes 3.0

0.1” w.g. (lab test)
.25” w.g. (typical install)

Local mechanical exhaust fans must achieve a minimum measured air flow rate

RESNET
RESIDENTIAL ENERGY SERVICES NETWORK

Verified Performance – Designed Air Flow Will Be Measured

RESNET – Verification of Minimum Air Flow Rate is *Required*

- Air flow must be ***measured*** with a powered flow hood or exhaust fan flow meter.
- Raters are starting to compare ***measured*** airflow of installed fans directly with ASHRAE 62.2.
- ***Measured*** continuous ventilation rate ***must*** be within ***100-120%*** of HVAC contractor design value. Some raters are verifying the design value is also aligned with ASHRAE.
- ***Intermittent*** bath fan ***measured*** air flow requirement ≥ 50 CFM.
- ***Continuous supply and exhaust*** fans must be rated at ***1.0 Sones or less.***
- ***Exhaust-only whole-house*** mechanical ventilation system must be ***verified*** that the fan turns on ***automatically***, without homeowner intervention.
- ***All*** ventilation fans ***must be verified*** as ENERGY STAR certified.

Bolometer used to verify installed performance

If a ventilation fan fails to meet the minimum air flow requirement during verification….it must be corrected!

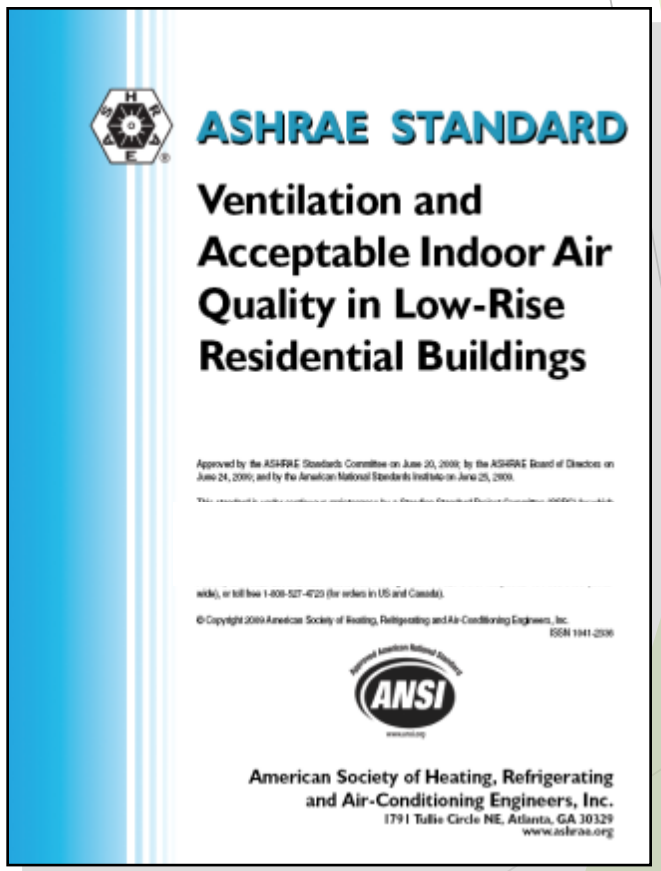
ASHRAE 62.2 – 2010 Scope

Single-family houses and Multi-family, 3 stories or fewer

Does not address thermal comfort

Goal is to achieve IAQ, but achieving IAQ can be complex and varies per occupant

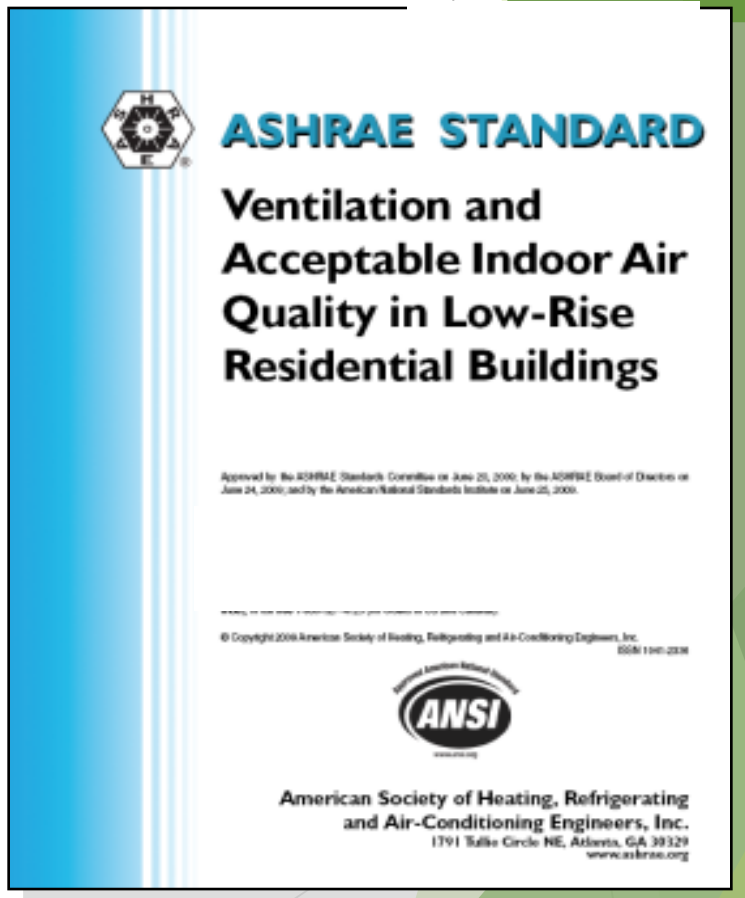
Various Addenda have been added to the 2010 version, primarily for multifamily issues – check for specifics per local Code



ASHRAE 62.2 – 2010 Standard

Meeting Standard

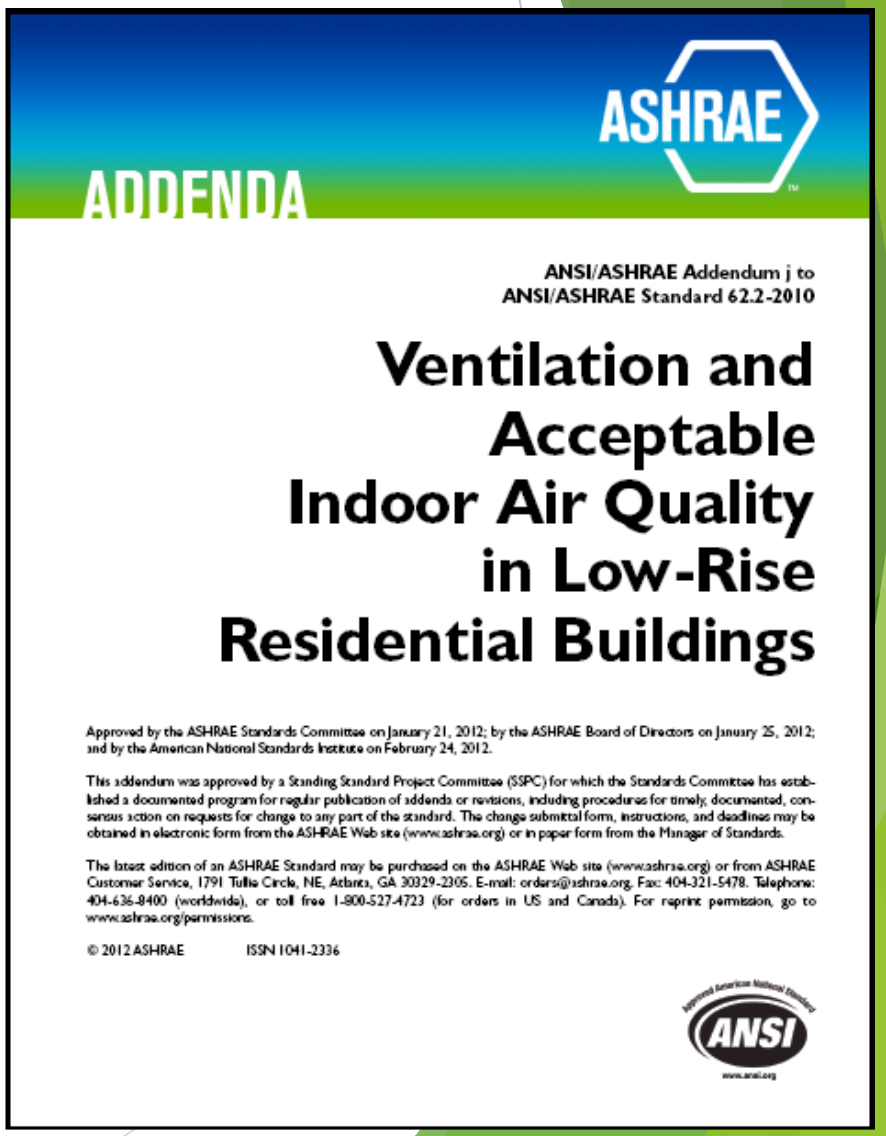
- Ventilation airflow rates based on number of bedrooms, plus *1%* square feet of conditioned space
- Whole-House Ventilation may be Continuous or Intermittent(spot/local)
  - Can meet Standard with low, continuous flow
  - Can meet Standard with higher, intermittent airflow
- Minimum Spot/Local exhaust for kitchen and bathroom
- Whole House fan flow *must be verified*
- Max Sone Rating requirements must be met:
  - Whole House Continuous & Intermittent: 1.0 Sone
  - Local Source (Spot) Intermittent: 3.0 Sone
  - Remote Mount with 4' duct(Inline Fans): N/A for Sone levels



ASHRAE 62.2 – 2013 Standard

Major Changes

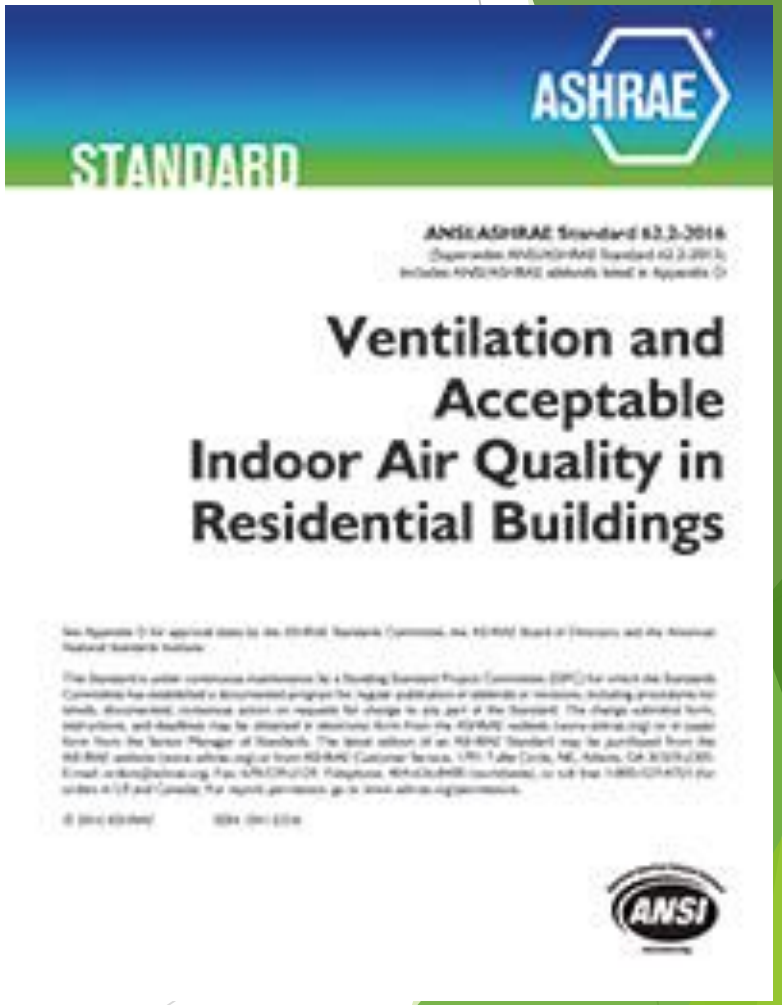
- Ventilation airflow rates based on number of bedrooms, plus **3%** square feet of conditioned space – *WHY?*
  - Blower door testing required in single-family for infiltration credit
  - No infiltration credit for leaks or operating windows in multifamily
- Supply and Balanced Ventilation must provide air directly from outdoors
- Minimize air movement by sealing penetrations, common walls, floors and chases
- Owner of project has control over ventilation system to meet ASHRAE Standards without occupant interference



ASHRAE 62.2 – 2016 Standard

Major Changes

- ASHRAE 62.2 – 2016 includes ALL Residential Buildings regardless of height.
- Partial infiltration credit is now available for horizontally attached dwelling units.
- The 2016 version clarifies that the floor area is all enclosed above and below grade areas suitable for year-round use. This includes basements or parts thereof that are finished in a manner similar to the rest of the dwelling.
- The term "whole-building ventilation" became "dwelling-unit ventilation“
- Ventilation requirements for unbalanced systems increased, providing an advantage for balanced systems.



Exhaust, Supply, Balanced Ventilation Pros and Cons

AIQ

Whole House Mechanical - Ventilation Types

EXHAUST Only Ventilation

- Single point or multi point whole house exhaust – fan in bath or kitchen
- Run continuous or intermittently to achieve recommended exhaust CFM
- Central stack system with Multiple room inlets
- Relies on uncontrolled supply, chiefly through leakage

SUPPLY Only Ventilation

- Central-Fan-Integrated Supply System
  Ducted into the return side of central heat/cool system ducting
- Stand-alone supply fan delivering air to the house
- Local spot exhaust fans in kitchen and bathrooms

BALANCED Ventilation System

- Separate supply and exhaust fan balanced systems
- Heat or Energy recovery systems

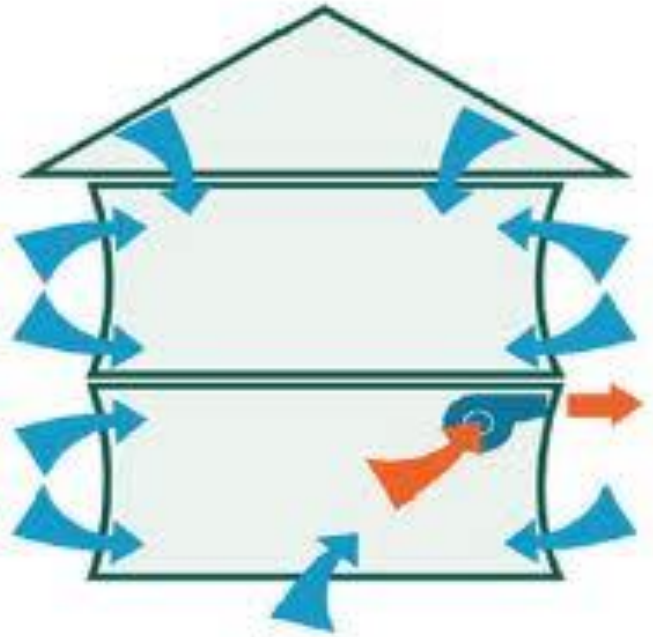
ASHRAE 62.2 – Whole Building EXHAUST

Typical Solution

- Continuous bathroom exhaust fans run at low speed or higher speed exhaust fan with intermittent control

Advantages

- Typically the most 'cost-effective' solution
- Can be designed to handle local bathroom exhaust and whole house needs with the same equipment
- Can provide drying potential in cold climates



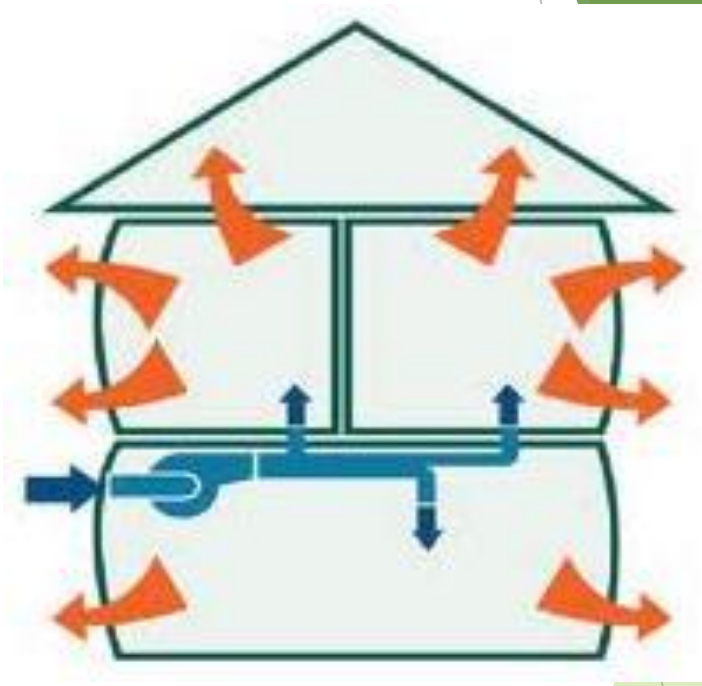
Effect on the House

- Negative indoor pressure draws exterior air into space by infiltration

ASHRAE 62.2 – Whole Building SUPPLY

Typical Solution

- Powered Supply Fan with Motorized damper, with intermittent open/close cycle attached to HVAC Return



Advantages

- Simple- but can be involved install
- Fresh air comes from a known location; can be filtered, heated, cooled, dehumidified
- Can reduce introduction of moisture into wall cavities in hot, humid climates
- Decreases chances for combustion appliance spillage

Effect on the House

- Positive indoor pressure pushes interior air outside by exfiltration

ASHRAE 62.2 – Whole Building BALANCED

Typical Solution

- HRV/ERV stand-alone unit, or attached to HVAC.

Advantages

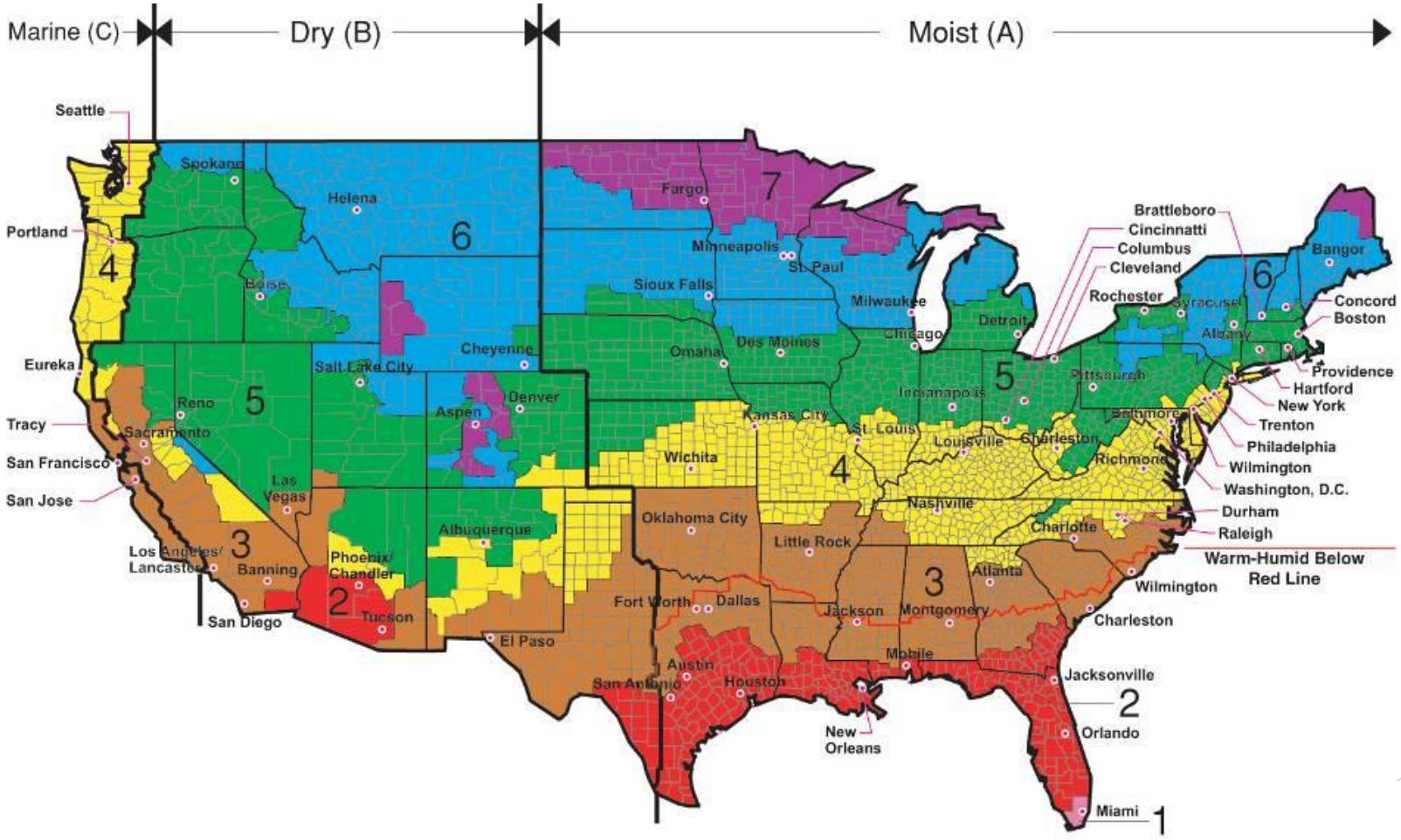
- House stays in balance
- Opportunity for heat and moisture (energy) recovery may make up for increased cost of HRV/ERV
- Remote mounted unit is quieter
- Fresh air comes from a known location; can be filtered, heated, cooled, dehumidified
- Ideal solution for high IAQ/IEQ environments, but be conscious of costs to operate AHU fan to distribute air.

Effect on the House

- Balanced airflow between interior and exterior
- Homeowner education required to ensure they understand, operate and maintain the system

Ventilation By Climate Zones

Ventilation is needed in all climates, strategies may change



Source (Spot) Ventilation
Improving IAQ/IEQ at Source

ASHRAE 62.2 – 'Spot' Bathroom Ventilation

Purpose of Bathroom 'Spot' Ventilation

- Remove pollutants at the source; moisture & odors
- Full bathroom (Shower/Tub) minimum airflow 50 cfm installed flow (may also run at lower speed to meet whole house but *MUST* be able to attain 50 cfm min)
- Ceiling or Wall Mount acceptable

ASHRAE 62.2 – Required Minimum Exhaust Flow Rate

	Continuous		Intermittent
Kitchen	5 ach		100 CFM
Bathroom	20 CFM		50 CFM

- **Continuous ventilation fans must have no greater than 1 sone**
- **Spot or switch controlled ventilation fans must have no greater than 3 sone**
- **ach = air changes per hour,**
- **Flow rate (CFM) = volume x 5 / 60**

ASHRAE 62.2 – 'Spot' Kitchen Ventilation

Purpose of Kitchen 'Spot' Ventilation

- Remove pollutants at the source; moisture, cooking odors & combustion gasses
- Kitchen (Cook top and oven) minimum airflow 100 cfm (may also run at lower speed to meet whole house but *MUST* be able to attain 100 cfm min)
- 400 cfm and greater require make-up air by certain Building codes
- Ceiling or Wall Mount acceptable

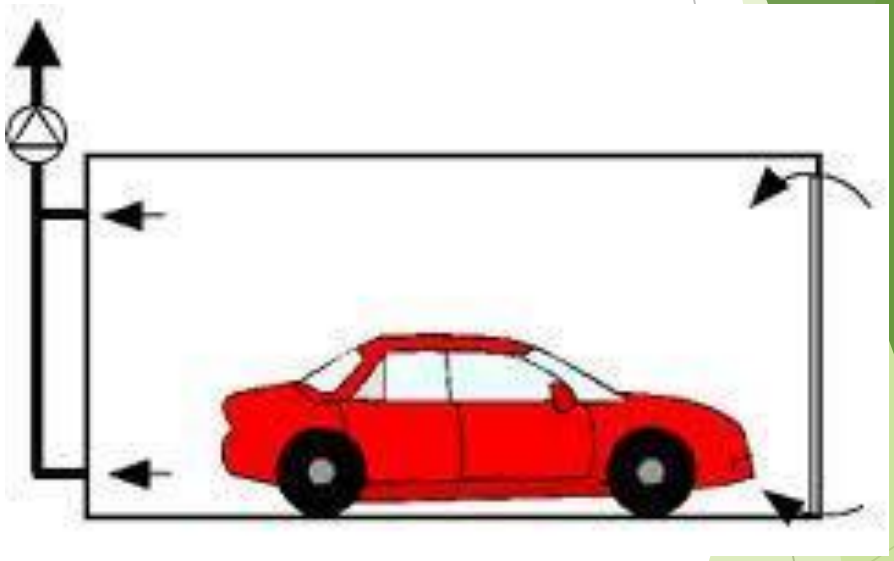
ASHRAE 62.2 – 'Spot' Garage Ventilation

Purpose of other 'Spot' Ventilation

- Remove pollutants at the source: car exhaust, paint cans, lawn mower, gas cans

- Garage ventilation minimums still being determined – 70 cfm recommended by ESTAR; ASHRAE debating 100 cfm/vehicle

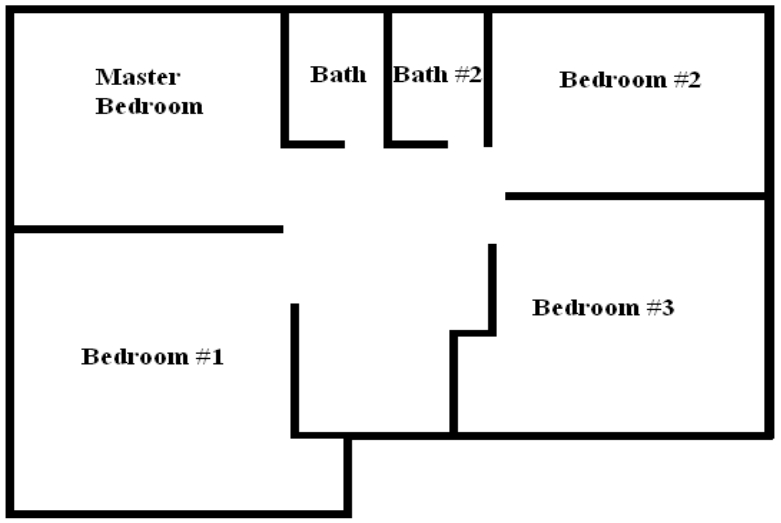
- Ceiling or Wall Mount Acceptable



Calculating the Amount of Ventilation …or cheat and use the chart…

Apply Your Knowledge

ASHRAE 2010



4 Bedrooms

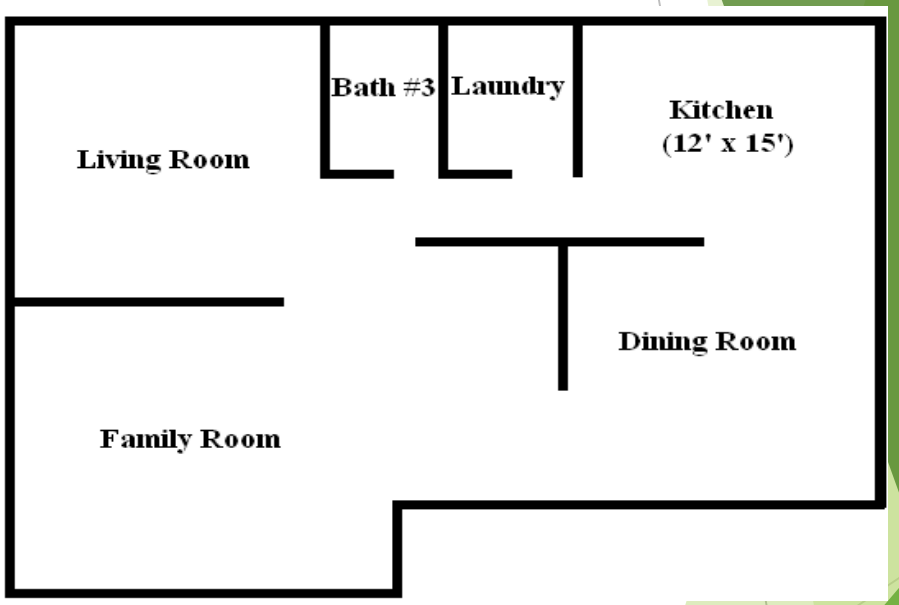
2600 sq. ft.

$CFM_{fan} = \mathbf{0.01A_{floor}} + 7.5(Number_{bedroom} + 1)$

Ventilation

= 63.5 CFM

ASHRAE 2013, 2016



$CFM_{fan} = \mathbf{0.03A_{floor}} + 7.5(Number_{bedroom} + 1)$

Ventilation

= 115.5 CFM

ASHRAE 62.2 – 2010: Meeting Standard & Code

TABLE 4.1a (I-P)
Ventilation Air Requirements, cfm

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	

What does this table recommend for our 2,600 square foot 4 bedroom house?

75 CFM from the 2010 Table, but 63.5 CFM if calculated

Installation Techniques
Reducing Static Pressure

Reducing Static Pressure

Poor ducting is the source of excessive static pressure

BEST material to use to install is Galvanized rigid pipe or PVC
BETTER material is aluminum flex
POOR material to use is vinyl or dryer vent. It will cause the worst static pressure and create excessive noise
In many jurisdictions the use of vinyl or dryer vent duct is against Code
Shortest length possible
Smoothest inner surface
Straightest duct run possible
Avoid sagging or weaving in the ducting
Avoid 90 degree elbows, particularly within 2 feet of the fan

Reducing Static Pressure

Poor ducting = excessive static pressure – The BAD:

Outside Terminations

Outside terminations can cause static pressure

Wall caps and roof jacks should have a backdraft damper

Make sure the backdraft damper opens freely

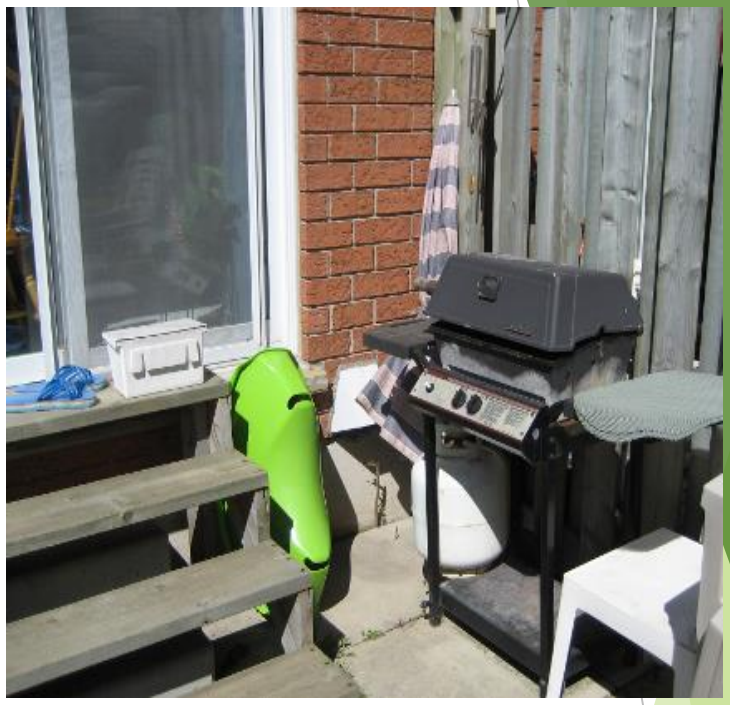
Make sure the duct is connected to the vent

New soffit vent designs have improved soffit vent terminations with HVI certified performance >

Exterior Vents

Place exterior vents carefully – especially fresh air intakes

- Access for cleaning
- Away from contaminants
- Away from other exhaust outlets, dryers, combustion equipment vents, driveways or very hot, humid areas



You Now Understand....

- The necessity of ventilation
- The fundamentals of ASHRAE 62.2 – 2010 and ASHRAE 62.2 – 2013, and ASHRAE 62.2 - 2016
- The difference in Whole-Building (House) ventilation, intermittent Whole-Building ventilation and Spot ventilation
- How to evaluate the differences in Exhaust, Supply and Balanced ventilation options to meet ASHRAE Standards
- How to compute the proper size of a ventilation system in a residence given the square footage and number of

Solutions…

Balanced Ventilation - Hybrid System

ONE Example - SelectCycler™ System at a Glance

Optional Range Hood Pressure Sensor

Thermostat

Controller

WhisperGreenSelect

FanConnect™ Wall Switch

Optional TempGuard

Supply Damper

HVAC/AHU

Panasonic

‘Hybrid’ Type Operation

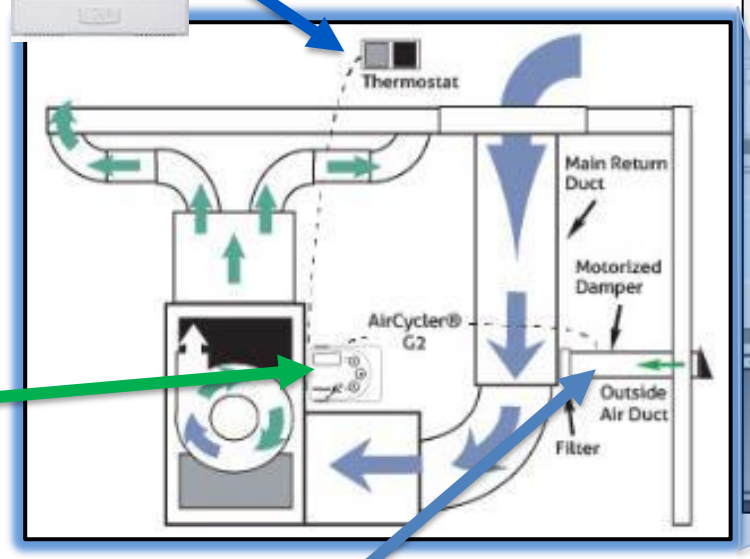
WhisperGreen Select & Supply Duct Attached to Central HVAC/AHU Return

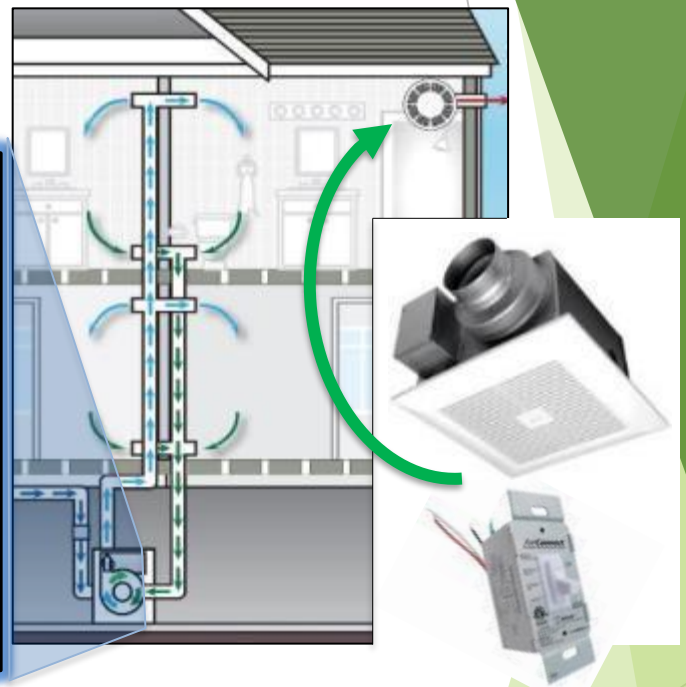
Mechanism-of-Action

1. Thermostat calls for heating or cooling.

Mechanism-of-Action

2. AirCycler controller opens damper to provide fresh air. Starts counting time/flow.





Mechanism-of-Action

3. Supply Damper opens; negative pressure in the return plenum brings in Fresh Air from outside to HVAC/AHU. Fresh air is distributed by AHU fan through existing ducting.

Mechanism-of-Action

4. If there is not enough heating or cooling to meet ventilation requirements, the AirCycler controller will activate the bathroom fan via the FanConnect™ Wall Switch **AND** open Supply Damper for a set period to meet requirements.

Panasonic

Solutions for Builders - Many Sources of Equipment…

Balanced Ventilation - Hybrid System

Air Cycler - https://www.aircycler.com/

Skuttle - http://skuttle.com/wp1/?page_id=278

Tamarack - http://www.tamtech.com/Airetrak-I-A-Advantage-Programmable-Bath-Fan-Control_p_80.html

Solutions…

Balanced Ventilation - Mechanism of Action for HRV/ERV

Where is the 'line' in the US for using H/ERV?

Mechanism of Action – HRV/ERV Overview

A Heat Recovery Ventilator (HRV) or Energy Recovery Ventilator (ERV) is used to pre-condition, Supply Air with Exhaust Air

The Mechanism of Action is simple physics

- Heat goes from Hot to Cold
- Two air streams pass by each other, one airstream absorbs the heat from the other airstream
- The exchange ‘tempers’ incoming air

There is corresponding energy savings from the transfer of energy from the outgoing airstream to the incoming airstream

Mechanism of Action – HRV Overview

HEAT Energy (Sensible) Recovery

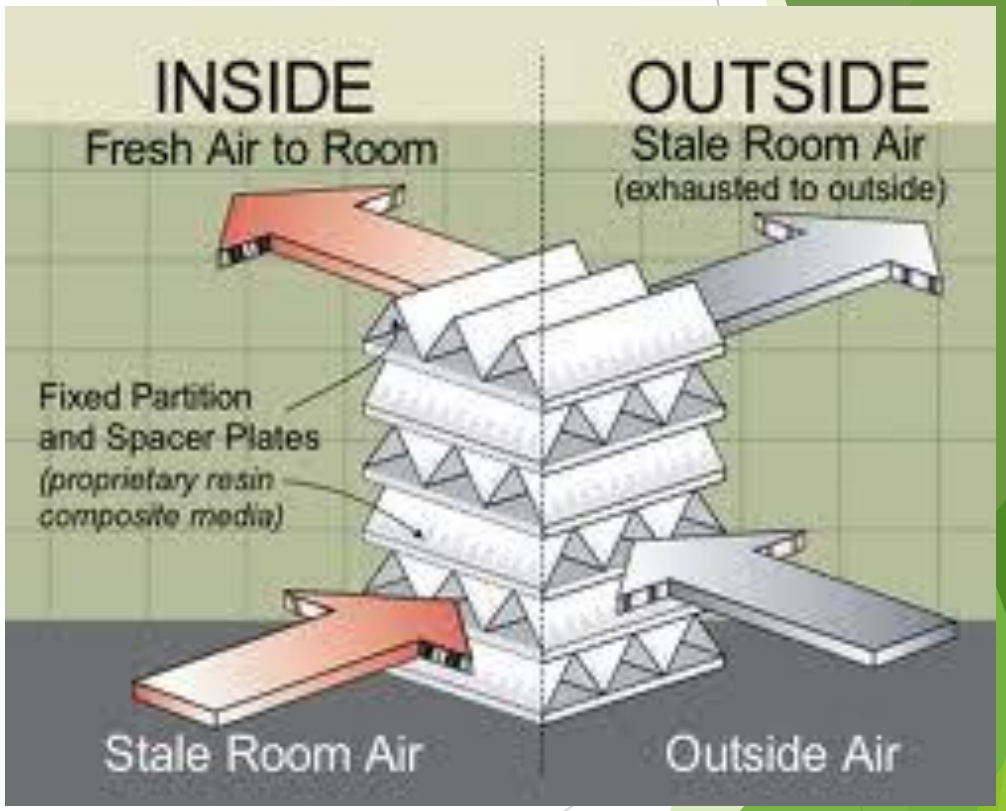
- Narrow, alternating, sealed heat exchange plates with cross-current airflow
- Air flows don't 'mix'

NO Moisture (Latent) Recovery

- NON-porous energy recovery core material

Pro's/Con's

- Lower static pressure
- HRV's require condensation pan or drip line
- Medium High to High efficiency
- Medium to Medium High cost



Mechanism of Action – ERV Overview

HEAT Energy (Sensible) Recovery

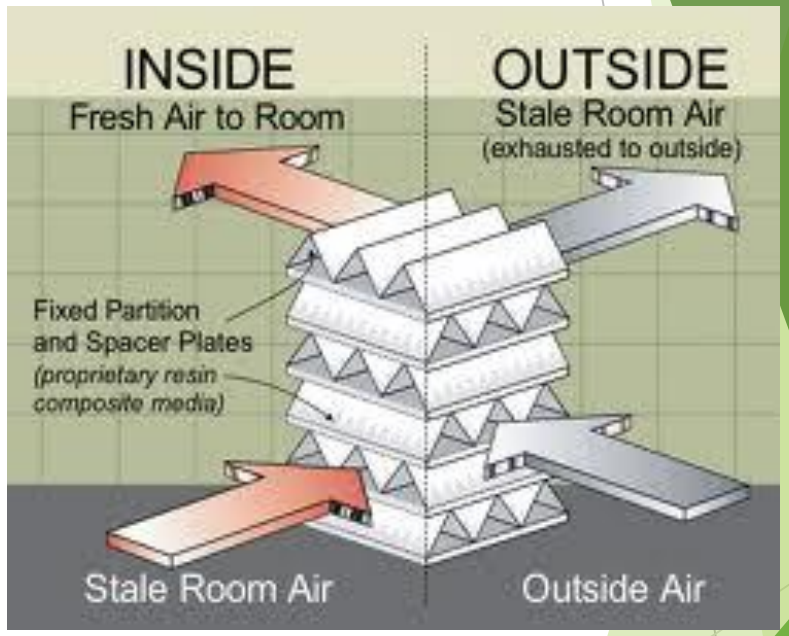
- Narrow, alternating, sealed heat exchange plates with cross-current airflow
- Air flows don't 'mix'

Moisture (Latent) Recovery

- Porous energy recovery core material allows GRAINS of water vapor to pass through core

Pro's/Con's

- Lower static pressure
- ERV's do NOT require condensation pan or drip line
- Medium to Medium High efficiency
- Medium to Medium High cost



ERV Mechanism of Action – Commercial Enthalpy Wheel

Energy (Sensible) Recovery

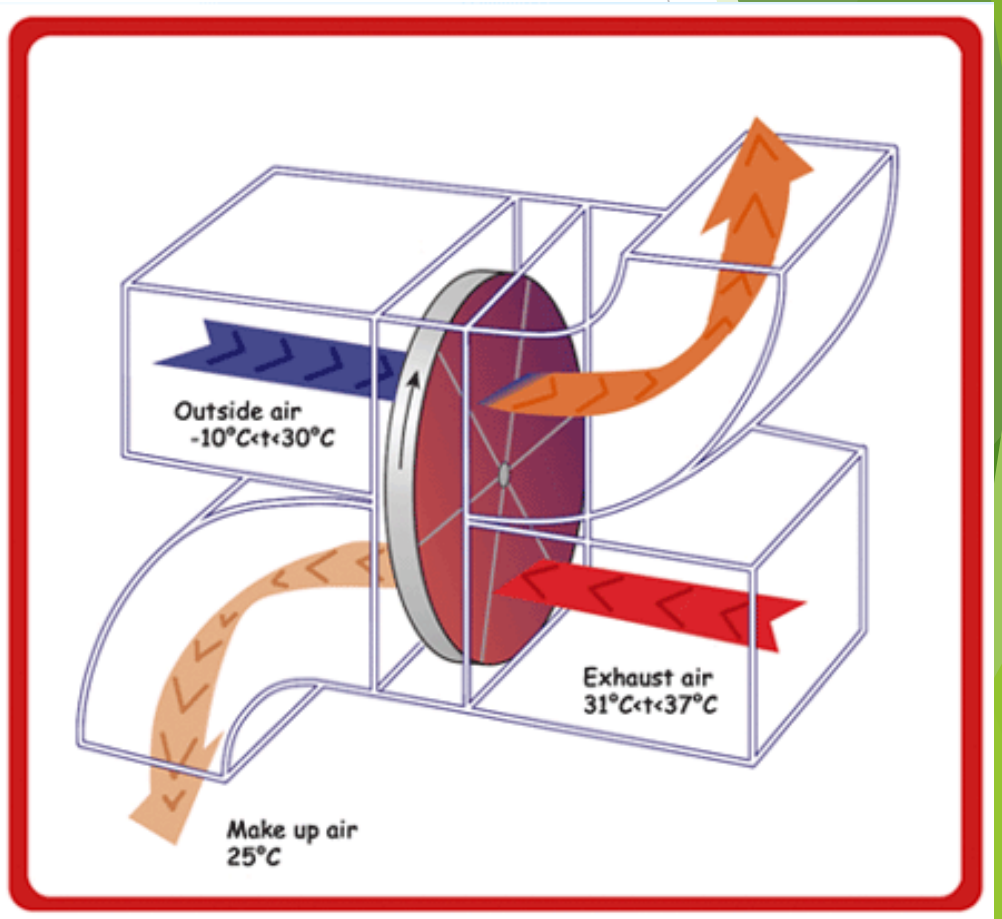
- Large rotating cylinder of air-permeable material that transfers heat differences between intake and exhaust
- Air flows 'mix'

Moisture (Latent) Recovery

- Desiccants – Silica Gel or Molecular Sieves

Pro's/Con's

- High efficiency
- High static pressure
- High maintenance, gaps between exchangers common
- 'Exclusively' commercial due to high maintenance and cost



A diagram of a rotary heat exchanger, or "heat wheel" (From Uptime Technology BV)

Discussion – A move towards ERV?

HRV – ERV 'Debate'

- Recommendations biased towards manufacturer strength
- Traditional 'Rule-of-Thumb' under scrutiny
- ERV studies show increased benefits of ERV in Cal & Canada; ERV 'line' is trending north
- ERV studies showing greater efficacy for smaller 'tight' homes or multifamily projects where HVAC is 'oversized'
- ERV studies show possibility of increased RH in Spring/Fall of Temperate climates
- ERV studies show possibility of increased RH in Spring/Summer/Fall of Hot Humid
- HRV/ERV's are 'dumb'

QUESTIONS?

So…What Do We Do Next?

LEAD – Energy Code Compliance in YOUR Buildings
SUPPORT YOUR CODE OFFICIAL
SUPPORT Local Code Chapter - NACEOA
Seal Tight and Ventilate Right!
Good Air Barrier & Insulation Details!
Other Training? UPCOMING from NYSERDA:

- Business Models for Energy Code
- Selecting Materials for Code Compliance
- Commissioning Services

Technical Support

- NYS – DOS
  518.474.4073
  Ask For Technical Support
  www.dos.state.ny.us/code
- US-DOE
  1-800-270-CODE
  www.energycodes.gov

We’re All In This Together!

Thank You!
Mike DeWein

North Branch Services
518-369-7545
dewein53@gmail.com

- Building Diagnostics
- Air Barrier Review &Inspections
- Thermal Imaging
- Training
- Energy Code Plan Review& Inspections

North Branch Services

Other Training

Top 10 Things You Really Need To Know	1 Hr.
Air Sealing for Success…Blower Door Test	2 Hr.
Residential Ventilation	2 Hr.
Commercial Air Barriers and the ECCCNYS	2 Hr.
Energy Code Hands On Workshop	3 Hrs.
The Code, New and Green Technologies	3 Hrs.
Manual J, S &D for the Energy Code	2 Hrs.

Coming Soon…

What's Coming With the NYStretch Code