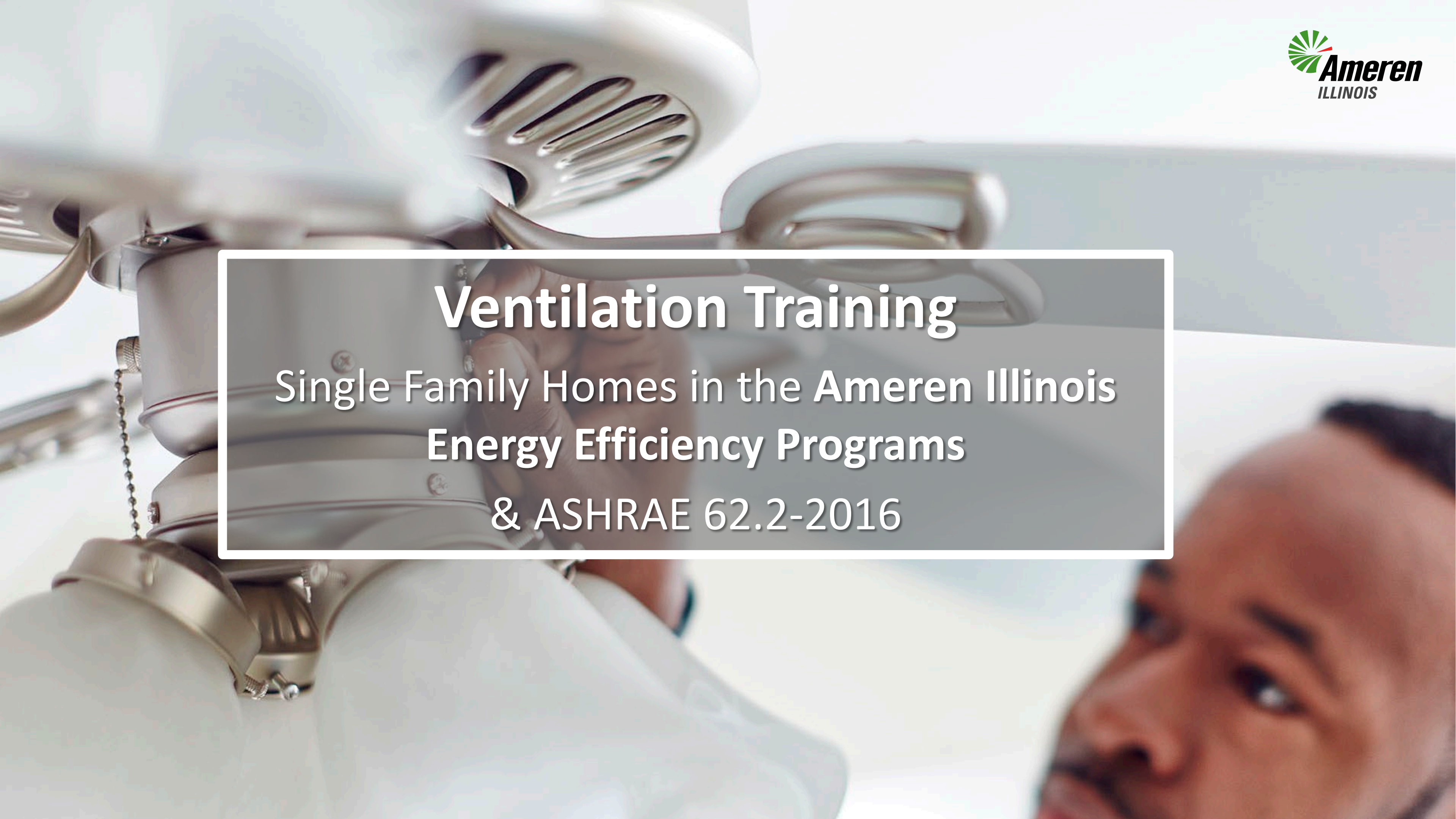


Ventilation Training

Single Family Homes in the **Ameren Illinois Energy Efficiency Programs**

& ASHRAE 62.2-2016

Agenda

Purpose

This training has the following purposes:

- ✓ Present highlights of ASHRAE Standard 62.2-2016 and changes from ASHRAE 62.2-2013
- ✓ Explain how the new standards are incorporated into the Ameren Illinois Energy Efficiency Programs for ***single family, residential homes***
- ✓ Provide guidance learned after the few years we have been using the ASHRAE 62.2-2013 Standard
- ✓ Prepare you for implementation of the new standard which will apply to single family projects with building envelope measures being incentivized for the 2020 Program Year and forward

The Importance of Ventilation

Why We Need It

A basic principle of building science is that thermal and pressure boundaries should work together. As an example, for a given home, air sealing the attic floor could easily increase the energy efficiency and comfort of the home more than would increasing the attic insulation from R-20 to R-49.

When we go beyond insulation and make a commitment to home performance, we also commit to air sealing the homes of the people we serve. Air sealing can result in a home without a minimum, adequate level of ventilation:

A home without adequate ventilation can have many problems to include:

- Inability of the house to dry itself promoting growth of mold, mildew, fungi, dust mites, bacteria, etc.
- Trapped pollutants, carbon monoxide, toxic and explosive gases

What is the ASHRAE 62.2 Standard

Purpose & Scope

- If defines the roles and minimum requirements for mechanical and natural ventilation system and the building envelope intended to provide acceptable indoor air quality in residential buildings

- It considers chemical, physical and biological contaminants that can affect air quality

- It recognizes that while acceptable indoor air quality is it's goal, we may not be able the achieve this even if all requirements are met
  - Diversity of sources and contaminants
  - Range of susceptibility in the population
  - Range of factors (temp, RH%, lighting)
  - Outdoor air quality
  - High-polluting events
  - Ventilation system maintenance

***Note*: Thermal comfort considerations are not included in this standard**

Process towards Compliance

How to Apply ASHRAE 62.2-2016

1. Dwelling Unit Ventilation Rate
   - Total Ventilation Rate
2. Local Exhaust
   - Alternative Compliance
3. Infiltration
   - Credit for Natural Ventilation
4. Required Mechanical Ventilation
   - Putting all the Pieces Together
5. System Design
   - Installation

The term “whole building” from the 2013 standard has been changed to “dwelling unit” in the 2016 standard

Products in this Presentation

There will be images and references to various products, brands, and techniques throughout this presentation

The Ameren Illinois Energy Efficiency Program does not recommend or endorse any manufacturer, brand, or specific model of any product shown or discussed today

1 Dwelling Unit Ventilation Rate

Total Ventilation Rate

Required Ventilation

The Standard requires each dwelling unit to have ***dwelling-unit ventilation*** in order to dilute indoor contaminants and provide acceptable indoor air quality

$Q_{tot} = (.03 \text{ x } A_{floor}) + (7.5 \text{ x } (N_{br} + 1)$

Q_{tot} = total required ventilation rate, cfm

A_{floor} = dwelling unit floor area, ft^2

N_{br} = number of bedrooms (not to be less than 1)

Example: a home with 1,000 square feet of main floor and 1,000 square feet of basement and two bedrooms

$Q_{tot} = (.03 \text{ x } 2{,}000) + (7.5 \text{ x } (2 + 1))$

$Q_{tot} = (60) + (22.5)$

$Q_{tot} = 83$ cfm

Dwelling Unit Floor Area

A_{floor}

- The standard makes use of **floor area** in calculating ventilation requirements
- ***Floor Area***: as all above- and below-grade finished areas as defined in ANSI Standard Z765, except that unfinished below grade, occupiable areas inside the pressure boundary shall be included as floor area
- In addendum *m*, the latter addition to the definition was established

Basements are now always included

- ANSI Standard Z765 defines finished area: an enclosed area in a house that is suitable for year-round use, embodying walls, floors, and ceilings that are similar to the rest of the house
- ANSI Standard Z765 defines above and below grade finished area: the above-grade finished square footage of a house is the sum of finished areas on levels that are entirely above grade. The below-grade finished square footage of a house is the sum of finished areas on levels that are wholly or partly below grade

Occupant Density

$N_{br} + 1$

- Part of the Standard to utilizes an alternate count of occupants when calculating the total ventilation rate if that number is known (instead of the number of bedrooms plus one)

Occupant Density

$N_{br} + 1$

- The Ameren Illinois Energy Efficiency Program will use the number of bedrooms plus one for calculating total ventilation rate
- This was taken into consideration with the addition of rental homes to the program
- We will ventilate to the intended occupancy of the dwelling unit

2 Local Exhaust

Local Exhaust

Contaminant Removal

ASHRAE 62.2-2016 requires local **demand-controlled** (able to be operated as needed by the occupant) **exhaust** in order to remove contaminants from those specific rooms that, because of their design function, are expected to contain sources of contaminants.

Each bathroom (room containing a bathtub, a shower, a spa, or other similar source of moisture) must have a **demand-controlled exhaust** fan that operates at a minimum of 50 CFM

Each kitchen must have a **demand-controlled exhaust** fan that operates at minimum 100 CFM

Be mindful of recirculating kitchen fans that do not exhaust to the exterior

For existing buildings, a 20 CFM credit per room is allowed for operable windows

Local Exhaust Deficit

For Existing Buildings

Local exhaust deficit =
Required flow rate (-) measured flow rate of the fan (-) operable window credit

Example #1: a bathroom has an exhaust fan with a measured flow rate of 24 CFM and also has an operable window. What is the local exhaust deficit?

The required flow rate for a bathroom is 50 CFM

The operable window credit is 20 CFM per room (not per window)

The **local exhaust deficit** for this bathroom is:

50 CFM – 24 CFM – 20 CFM = 6 CFM

Local Exhaust Deficit

Example Two - Bathroom

Example #2: a bathroom has an exhaust fan with a measured flow rate of 76 CFM and does not have an operable window. What is the local ventilation deficit?

Local exhaust deficit =
Required flow rate (-) measured flow rate of the fan (-) operable window credit

The required flow rate for a bathroom is 50 CFM

The **local exhaust deficit** for this bathroom is:

50 CFM – 76 CFM – 0 CFM = 0 CFM (cannot be negative)

Local Exhaust Deficit

Example Three - Kitchen

Example #3: a kitchen has a recirculating exhaust fan and four operable windows. What is the **local exhaust deficit**?

Local exhaust deficit =
Required flow rate (-) measured flow rate of the fan (-) operable window credit

A recirculating exhaust fan is not vented to the outside = zero flow

The required flow rate for a kitchen is 100 CFM

The operable window credit is 20 CFM per room (not per window)

The **local exhaust deficit** for this kitchen is:

100 CFM – 0 CFM – 20 CFM = 80 CFM

Local Exhaust Deficit

Example Four - Kitchen

Example #4: a kitchen has an exhaust fan vented to the outside with a measured flow rate of 42 CFM and also has an operable window. What is the **local exhaust deficit**?

Local exhaust deficit =
Required flow rate (-) measured flow rate of the fan (-) operable window credit

The required flow rate for a kitchen is 100 CFM

The operable window credit is 20 CFM per room (not per window)

The **local exhaust deficit** for this kitchen is:

100 CFM – 42 CFM – 20 CFM = 38 CFM

Local Exhaust Alternative Compliance

Supplemented by Total Required Ventilation

Any local demand-controlled exhaust deficit may be addressed by adding a new fan, replacing an existing fan, upgrading a fan, or upgrading ducts to increase flow

Alternatively, the deficit may be addressed by adding an **alternative compliance allowance** to the required whole-building ventilation flow rate

The **alternative compliance allowance** is equal to one fourth of the local demand-controlled exhaust deficit

Example: Bathroom #1 deficit = 26 CFM, bathroom #2 deficit = 6 CFM, kitchen deficit = 80 CFM

Total local demand-controlled exhaust deficit = 26 + 6 + 80 = 112 CFM

Alternative compliance allowance = 112 CFM / 4 = 28 CFM

3

Infiltration Credit

Infiltration Credit

For Existing Buildings

ASHRAE 62.2-2016 allows for some or all of the required dwelling unit ventilation rate (Q_{tot}) to be satisfied by an **infiltration credit** based on a blower door test

BPI-1200, Annex I, provides a formula to assist in the calculation of the **infiltration credit** when a single point blower door test is being performed

ASHRAE 62.2 is a ventilation standard for new construction that contains an appendix (Normative Appendix A) to adapt to existing [retrofit] housing

***Side Note*:** ASHRAE 62.2-2016 only allows 2/3 of the infiltration credit in new construction.

Infiltration Credit

How to Calculate

Infiltration credit: $Q_{inf} = Q_{50} \times S \times wsf \times 0.052$

Q_{inf} infiltration credit, cfm

Q_{50} = blower door flow rate, CFM@50

S = story factor, chart look up

wsf = weather and shielding factor, chart look up

Example #1: A two-story house with a blower door flow rate of 3,000 CFM_{50} located in Peoria

$Q_{inf} = 3{,}000\ CFM_{50} \times 1.32 \times 0.55 \times 0.052 = 113\ CFM$

Air Sealing & Ventilation

The required mechanical ventilation flow rate Q_{fan} will change after air sealing. Since the measured blower door flow rate Q_{50} will be lower after air sealing, the infiltration credit Q_{inf} will also be lower.

Story Factors

BPI-1200 Annex I.1.4

Stories Above Grade	S Factor (S)
1	1.00
1.5	1.18
2	1.32
2.5	1.44
3	1.55

Weather & Shielding Factors (wsf)

ASHRAE 62.2-2016 Normative Appendix B

wsf	Location	wsf	Location
0.44	Mount Vernon	0.57	Urbana Champaign
0.47	Marion	0.57	Aurora
0.48	Belleville Scott AFB	0.58	Rockford
0.51	Quincy	0.58	Moline / Quad Cities
0.51	Sterling / Rock Falls	0.58	W Chicago / Du Page
0.55	Peoria	0.59	Chicago / Waukegan
0.56	Decatur	0.60	Chicago O'Hare
0.57	Springfield	0.60	Bloomington / Normal

Infiltration Credit

Example Two

Example #2: A two-story house with a blower door reading of 3,000 CFM_{50} located in Marion

Infiltration credit: $Q_{inf} = Q_{50} \times S \times wsf \times 0.052$

Q_{50} = blower door flow rate measured at 50 pascals = 3,000 CFM_{50}

S = story factor (for a two-story house = 1.32)

wsf = weather and shielding factor (for Marion = 0.47)

$Q_{inf} =$ 3,000 CFM_{50} x 1.32 x 0.47 x 0.052 = 97 CFM

4

Required Mechanical Ventilation

Required Mechanical Ventilation

Mechanical ventilation may be required for some homes, either to meet a local demand-controlled exhaust deficit, to satisfy the required dwelling unit ventilation flow rate (Q_{tot}), or both

$$Q_{fan} = Q_{tot} + \text{alternative compliance supplement} - Q_{inf}$$

Q_{fan} = Required mechanical ventilation flow rate, cfm

Q_{tot} = Required dwelling unit ventilation flow rate, cfm

Q_{inf} = Infiltration credit, cfm

If Q_{fan} is less than or equal to 15 CFM, no additional dwelling unit ventilation is required

Required Mechanical Ventilation

Example One

Example #1: A home with a required dwelling unit ventilation flow rate of 100 CFM, a local demand-controlled exhaust shortfall of 90 CFM, and an infiltration credit of 65 CFM

$\mathbf{Q_{fan}}$ = Q_{tot} (+) alternative compliance supplement (-) Q_{inf}

Q_{tot} = 100 CFM

Alternate compliance supplement = 90 CFM / 4 = 23 CFM

Q_{inf} = 65 CFM

$\mathbf{Q_{fan}}$ = 100 CFM (+) 23 CFM (-) 65 CFM = 58 CFM

Required Mechanical Ventilation

Example Two

Example #2: A home with a required whole-building ventilation flow rate of 100 CFM, a local demand-controlled ventilation shortfall of 16 CFM, and an infiltration credit of 90 CFM

$\mathbf{Q_{fan}}$ = Q_{tot} (+) alternative compliance supplement (-) Q_{inf}

Q_{tot} = 100 CFM

Alternate compliance supplement = 16 CFM / 4 = 4 CFM

Q_{inf} = 90 CFM

$\mathbf{Q_{fan}}$ = 100 CFM (+) 4 CFM (-) 90 CFM = 14 CFM

Since $\mathbf{Q_{fan}}$ ≤ 15 CFM, no additional whole-building ventilation is needed.

5

System Design

Mechanical Ventilation

Path to Compliance

Required mechanical ventilation (Q_{fan}) can be provided by a system of:

- One or more exhaust or supply fans
- Balanced fans, HRV, ERV
- Outdoor air ducts supplied to the return side of the air handler if the manufacturers requirements for return air temperature are met

Mechanical Ventilation

Continuous and Intermittent

The required whole-building mechanical ventilation system can run **continuously** or **intermittently**

Continuous and intermittent mechanical ventilation are designed to run automatically without occupant intervention

Continuous and intermittent mechanical ventilation must have a readily accessible override control provided to the occupant

Override control is different from demand controlled ventilation which is designed to be operated as needed by the occupant to provide local exhaust

<u>Homeowner education is important</u>

Mechanical Ventilation

Continuous versus Intermittent

Example: Q_{fan} = 150 CFM

Continuous

- The requirement could be met by a single exhaust fan running at 150 CFM
- The requirement could be met by two separate exhaust fans each running at 75 CFM
- The requirement could be met by three separate exhaust fans each running at 50 CFM

Intermittent

- The requirement could be met by four separate exhaust fans each running at 75 CFM for 30 minutes on and 30 minutes off per hour
- The requirement could be met by three separate exhaust fans each running at 100 CFM for 90 minutes on and 90 minutes off

Bath Fan as ASHRAE Compliance

A Common Retrofit Solution

If a bathroom exhaust fan is operated continuously to satisfy the required whole-building ventilation flow rate, the local demand-controlled exhaust requirement for that bathroom will be reduced from 50 CFM to either Q_{fan} or 20 CFM, whichever is larger.

Example: During a home efficiency project, a bathroom exhaust fan is installed and Q_{fan} is calculated to be 36 CFM. The fan is set to operate continuously at 36 CFM. The local demand-controlled exhaust requirement for that bathroom is reduced from 50 CFM to 36 CFM.

Example: During a home efficiency project, a bathroom exhaust fan is installed and Q_{fan} is calculated to be 18 CFM. The fan is set to operate continuously at 20 CFM. The local demand-controlled exhaust requirement for that bathroom is reduced from 50 CFM to 20 CFM.

Exhaust Fan Testing Equipment

Capture Exhaust Fan Flows

Flow Meter

Anemometer

Balometer

Powered Options

Reduce Pressure to Zero and Measure the Flow

Powered Flow Hood Unit

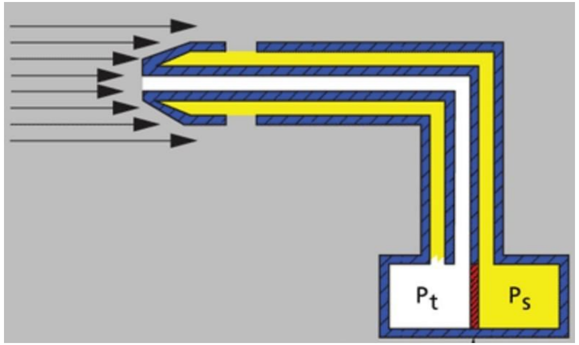
Non-Powered Option
(with back pressure correction)

Adapter for to use with duct leakage test fans

Pressure Measurements

Pitot Tube

This is ***not*** your static pressure probe



Use this with a differential manometer, technique, and some math

HRV and ERV

Balanced Ventilation

A **Heat Recovery Ventilator (HRV)** is a device which moves air in and out of a home while at the same time minimizing heat losses or gains.

An **HRV** provides a form of balanced ventilation. It uses one fan to pull fresh air into a home, another fan to push stale air out, and a heat exchanger to transfer heat between the streams of air coming in and going out.

During winter an **HRV** can typically recover 70% to 80% of the heat in the outgoing airstream. An **HRV** can be effective in the summer months, when it will take heat from incoming fresh air and transfer it to stale exhaust air.

An **HRV** contains filters that keep particulates such as pollen or dust from entering the home

HRV and ERV

Types & Uses

A typical **HRV** for residential use might move as much as 200 CFM, but the fan speed or frequency can be set to meet the needs of the home.

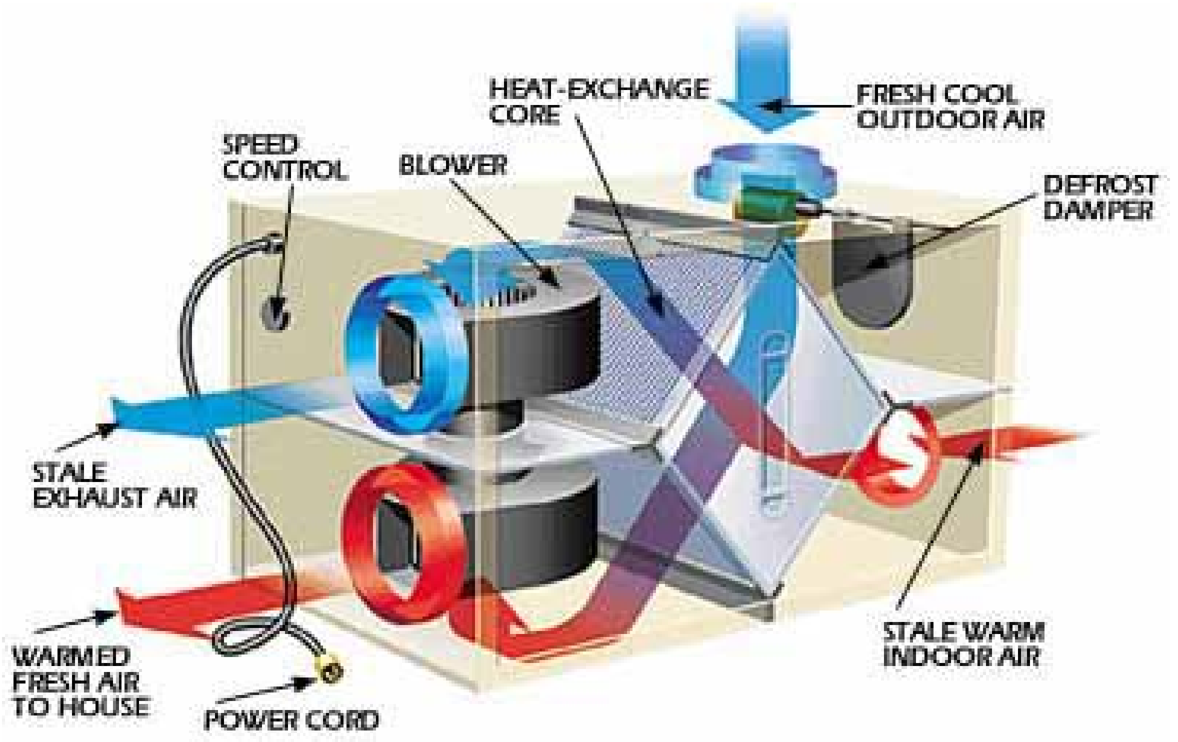
HRVs are ideal in winter for tight, moisture-prone homes because they replace humid indoor air with dry, fresh air.

An **Energy Recovery Ventilator (ERV)** is similar to an **HRV**. In summer, an **ERV** will not only transfer heat from the incoming air to the outgoing air, it will also transfer the latent energy between the two air streams.

For homes where excessive outdoor humidity is a problem during summer, an **ERV** may be more suitable than a **HRV**. For a given amount of required mechanical ventilation, **HRV**s and **ERV**s are more energy efficient than a bathroom exhaust fan.

Recovery Ventilator

The Inner Details



Energy Recovery Ventilator

Spot ERV

40 CFM maximum

Energy Recovery Ventilator

Wall-Mount

Heat Recovery Ventilator

Suspended

Energy Recovery Ventilator

Basement, Integrated with HVAC Ducting

Exhaust Ventilation Options

Common Solutions

Pick-A-Flow™ Fans

Single Flow Rate Fans

Switches for single flow-rate fans

Exhaust Ventilation

In-line Options

Continental Fan Manufacturing™ DX150A-ES

Fantech® FR100

Supply Ventilation

Positive Pressure

AirCycler® Products

Panasonic *WhisperFresh* Select™
Supply Air (FV-15NLFS1)

Sound Requirements

Increasing Occupant Acceptance

Fans installed for whole building ventilation or for continuous local exhaust must have a **sound** rating of 1.0 sone or less

Fans installed for local demand-controlled exhaust must have a **sound** rating of 3.0 sones or less

As an exception, there is no **sound** rating requirement for:

- Remotely mounted fans with at least four feet of duct between the fan and the intake grille
- Systems that use a central air handler fan
- Fans with a maximum rating of at least 400 CFM
- **In retrofit situations,** an existing fan used to satisfy ventilation requirements

Homeowner Education

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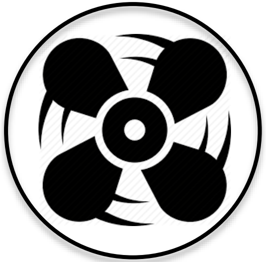
A Critical Component

- The ventilation system must have a readily accessible and appropriately labeled override switch that allows homeowners/occupants to suspend normal system operation

Continuous Ventilation Fan



- Local exhaust fan switches and "fan on" switches shall be permitted as override controls
- The "fan on" switch on a heating or air conditioning system shall be permitted as an operational control for systems inducing ventilation air through a duct to the return side of an HVAC system
- Provide the homeowner with instructions on the proper operation of the ventilation system and instructions on any required maintenance

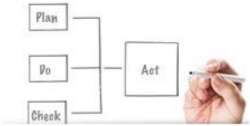
Program Documentation

Energy Audit Diagnostic Test Form

Recording ASHRAE Compliance

- The Energy Audit Diagnostic Test form located at ***AmerenIllinois**Savings.com* contains everything you need to evaluate ASHRAE 62.2-2016 ventilation requirements
- It is located in:

Existing Residential Program Allies



Draw on our Resources

Welcome to the Program Ally page for the Ameren Illinois Energy Efficiency Residential Program! This area of the website will provide you with valuable information, including access to program applications, training resources, and co-branding materials and guidelines. Please check this webpage often for the latest news and content for Program Allies. As always, thank you for everything you do for the Ameren Illinois Energy Efficiency Program and Ameren Illinois customers!

- In *Project Documents*, under the *Income Qualified Single Family* section:

Income Qualified Single Family

- Core Program Ally Resources
- Homeowner Documents
- Project Documents

HEP Income Qualified

HEP Income-Qualified – Energy Audit Collection Form
HEP Income-Qualified – Energy Audit Test Form
HEP Income-Qualified – Energy Audit Inspection Disclaimers
HEP Income-Qualified – Combined Work Scope/Incentive Application and Energy Audit Collection Form (Excel)

Charts and Tables

Within the Test Form

There are a variety of charts, tables, and useful packets of information within the Energy Audit Test Form to utilize:

- Spillage testing info
- WSF info for Illinois cities
- Story Factors from BPI Annex I
- Ambient CO action levels

Carbon monoxide threshold limits BPI-1200 7.9.5 Table 1	
Appliance	CO Threshold Limit
Central Furnace (all categories)	400 ppm air free
Boiler	400 ppm air free
Floor Furnace	400 ppm air free
Gravity Furnace	400 ppm air free
Wall Furnace (BIV)	200 ppm air free
Wall Furnace (Direct Vent)	400 ppm air free
Vented Room Heater	200 ppm air free
Unvented Room Heater	200 ppm air free
Water Heater	200 ppm air free
Oven/Broiler	225 ppm as measured
Clothes Dryer	400 ppm air free
Refr[illegible]	[illegible]d
Gas Log (gas fi[illegible]	[illegible]d in vent
installed in wood burning fi[illegible]	[illegible]fire box

Illinois Weather & Shielding Factors (wsf) ASHRAE 62.2-2013 App B	
0.44	Mount Vernon
0.47	Marion
0.48	Belleville Scott AFB
0.51	Quincy
0.51	Sterling / Rock Falls
0.55	Peoria
0.56	Decatur
0.56	Chicago Midway
0.57	Springfield
0.57	Urbana Champaign
0.57	Aurora
0.58	Rockford
0.58	Moline / Quad Cities
0.58	W Chicago / Du Page
0.59	Chicago / Waukegan
0.60	Chicago O'Hare
0.60	Bloomington / Normal

Story Factors (S) BPI-1200 Annex I.1.4	
Stories Above Grade	Factor
1	1.00
1.5	1.18
2	1.32
2.5	1.44
3	1.55

Section 6: Infiltration Test

Blower Door

- **Initial** and **Final** Infiltration test results conducted with your blower door are placed here for use in calculations later in the form

Section 6: Infiltration Test							
Initial blower door measurement, Q_{50}:		T_{out}:		Final blower door measurement Q_{50}:		T_{out}:	

Section 7: Floor Area

Measurements

- Floor area square footage (remember to include the basement)
- Number above grade stories
- Number of bedrooms (used to infer intended/accepted occupancy of the dwelling unit)

Section 7: Floor Area (as per ASHRAE 62.2-2016)					
Floor area: all above- and below-grade finished areas as defined in ANSI Standard Z765, except that unfinished below grade, occupiable areas inside the pressure boundary shall be included as floor area. ANSI Z765; finished area: an enclosed area in a house that is suitable for year-round use, embodying walls, floors, and ceilings that are similar to the rest of the house.					
Floor area in square feet:		Stories:		Number of bedrooms:	

Section 8: Ventilation Requirements

Audit Testing Assessment

- Audit/Initial Test
- The auto-calculation of the formulas from earlier in this presentation are performed here for your convenience
- Remember to enter a “0” for the kitchen, if applicable

Section 8: Ventilation Requirements Pre-Test (ASHRAE 62.2-2016)

Local demand-controlled ventilation	Required	Measured or Assume Zero	Shortfall	Window Credit 20 CFM (Y / N)	Deficit
Bathroom #1 demand-controlled flow rate (CFM):	50				
Bathroom #2 demand-controlled flow rate (CFM):	50				
Bathroom #3 demand-controlled flow rate (CFM):	50				
Bathroom #4 demand-controlled flow rate (CFM):	50				
Half-Bathroom #5 demand-controlled flow rate (CFM):	0		0	N/A	0
Kitchen #1 demand-controlled flow rate (CFM):	100				
Kitchen #2 demand-controlled flow rate (CFM):	100				
Note: If the flow through an operating, vented, kitchen exhaust fan or bathroom exhaust fan <u>cannot</u> be measured, then assume zero CFM. ASHRAE 62.2-2016 Appendix A3.1				Total local deficit:	
Is whole-building mechanical ventilation required?		Weather and shielding factor (wsf):		Story factor (S):	
Required whole-house ventilation rate Q_{tot} = (.03 x floor area) + (7.5 x (# of bedrooms +1)):					
Alternative compliance supplement (total local deficit / 4):					
Adjusted Q_{tot} for alternative compliance supplement:					
Note: if $Q_{fan} \leq 15$ CFM then no additional whole-building mechanical ventilation is required	Infiltration credit for blower door measurement $Q_{inf} = Q_{50}$ x S x wsf x .052:				
	Required whole-house mechanical ventilation rate Q_{fan} = Adjusted Q_{tot} - Q_{inf}:				

Section 9: Ventilation Requirements

Post Work Project Test

- Audit/Initial Test
- The auto-calculation of the formulas from earlier in this presentation are performed here for your convenience
- Remember to enter a "0" for the kitchen, if applicable

Section 9: Ventilation Requirements Post-Test (ASHRAE 62.2-2016)

Local demand-controlled ventilation	Required	Measured or Assume Zero	Shortfall	Window Credit 20 CFM (Y / N)	Deficit	Alt Comp (Y)
Bathroom #1 demand-controlled flow rate (CFM):	50					
Bathroom #2 demand-controlled flow rate (CFM):	50					
Bathroom #3 demand-controlled flow rate (CFM):	50					
Bathroom #4 demand-controlled flow rate (CFM):	50					
Half-Bathroom #5 demand-controlled flow rate (CFM):	0		0	N/A	0	
Kitchen #1 demand-controlled flow rate (CFM):	100					
Kitchen #2 demand-controlled flow rate (CFM):	100					
Note: If the flow through an operating, vented, kitchen exhaust fan or bathroom exhaust fan <u>cannot</u> be measured, then assume zero CFM. ASHRAE 62.2-2016 Appendix A3.1				Total local deficit:		
Is whole-building mechanical ventilation required?		Weather and shielding factor (wsf):			Story factor (S):	
Required whole-house ventilation rate Q_{tot} = (.03 x floor area) + (7.5 x (# of bedrooms +1)):						
Alternative compliance supplement (total local deficit / 4):						
Adjusted Q_{tot} for alternative compliance supplement:						
Note: if $Q_{fan} \leq 15$ CFM then no additional whole-building mechanical ventilation is required	Infiltration credit for blower door measurement $Q_{inf} = Q_{50}$ x S x wsf x .052:					
	Required whole-house mechanical ventilation rate Q_{fan} = Adjusted Q_{tot} - Q_{inf}:					

Strategy Description

After Section 9

- If you have any notes regarding the chosen ventilation strategy, place them here
- If you are using continuous ventilation (not intermittent) your timer set point will be 60 minutes; this is not the on-demand delay timer setting from some fans

The **Timer Set Point** is 60 when you are running the fan continuously to satisfy ventilation requirements

Describe the strategy used to make any corrections to local exhaust deficits and/or required whole-building mechanical ventilation:		
	Installed Whole-Building Mechanical Ventilation	
	Measured Continuous Ventilation Rate:	
	Timer Set point (minutes/hour):	

Closing Notes

Helpful tips

- If you are using the bath exhaust fan to comply with ASHRAE requirements, remember to have the fan running at it highest speed during depressurization testing for combustion appliances
- You must measure the kitchen exhaust fan, it cannot be ignored
- 6” terminations can reduce back pressure resulting in reduced air flow and increased noise

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