Ventilation

ASHRAE 62.2 COMPLIANCE

How do we get there?

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WHATS NEW IN ASHRAE 62.2 2016

- Controls (Override)
  - Shutoff for maintenance or outdoor air issues (humidity, pollutants)
  - Includes
    - Switch
    - Dedicated circuit breaker
    - Fan controls
    - Extension cord
  - Must be labeled
  - Multifamily – switch does not need to be accessible to the occupants

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WHATS NEW IN ASHRAE 62.2 2016

- Floor area definition – based on finished space
  - Shouldn't change how we are doing it

- Applies to all multi-family dwelling units – not common areas (hallways, laundry rooms, etc.) Those are covered by 62.1

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WHATS NEW IN ASHRAE 62.2 2016

- Multifamily Infiltration Credit now available
  - Only for horizontally attached units (row houses, town houses, etc)
  - Reduced by the surface area adjacent to other units or garages
  - Must still meet compartmentalization requirements – use blower door and infrared camera

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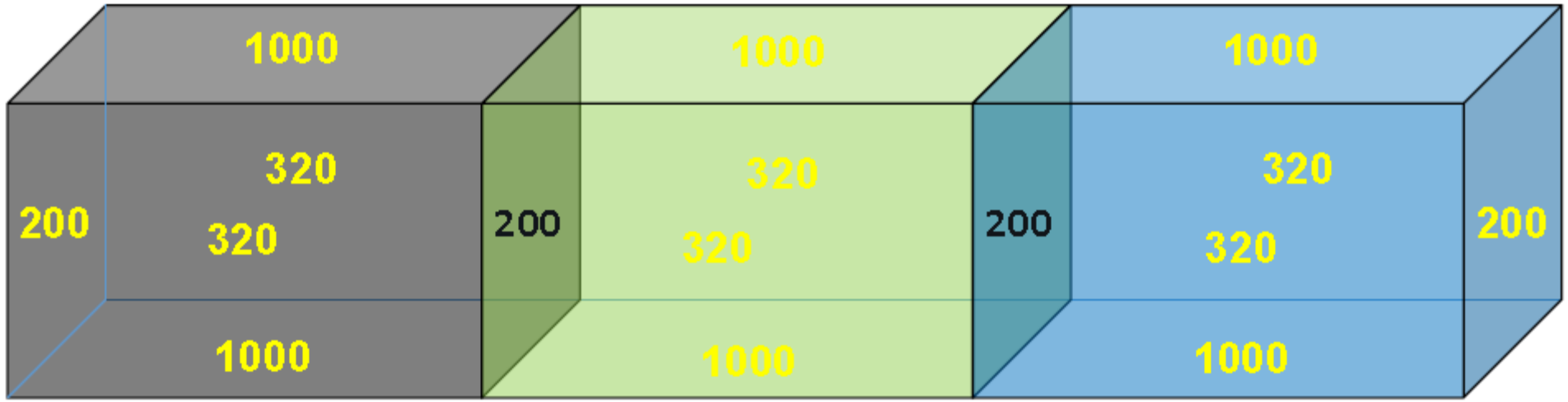
WHATS NEW IN ASHRAE 62.2 2016

Multifamily Infiltration Credit

Consider a triplex, each unit is 40’ x 25’ with 8’ ceilings



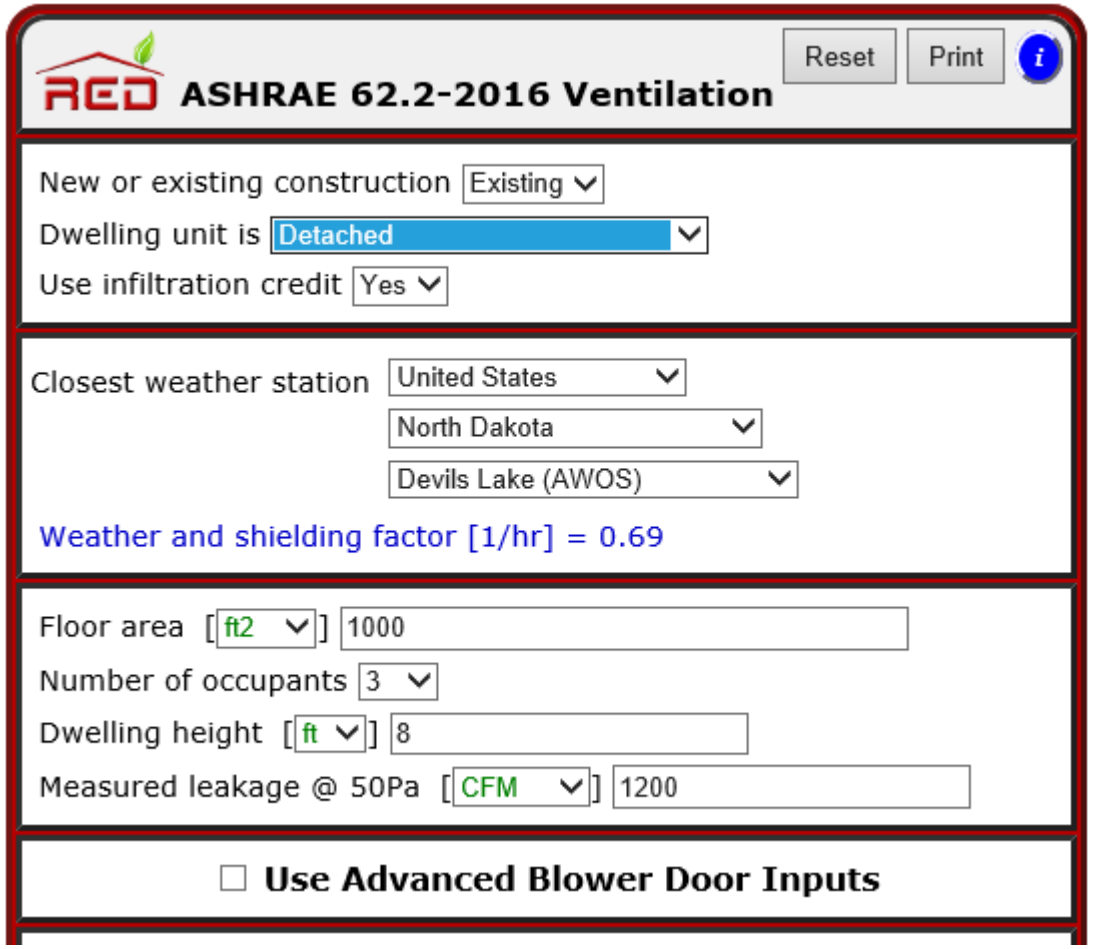
3040 sq ft surface area in each unit

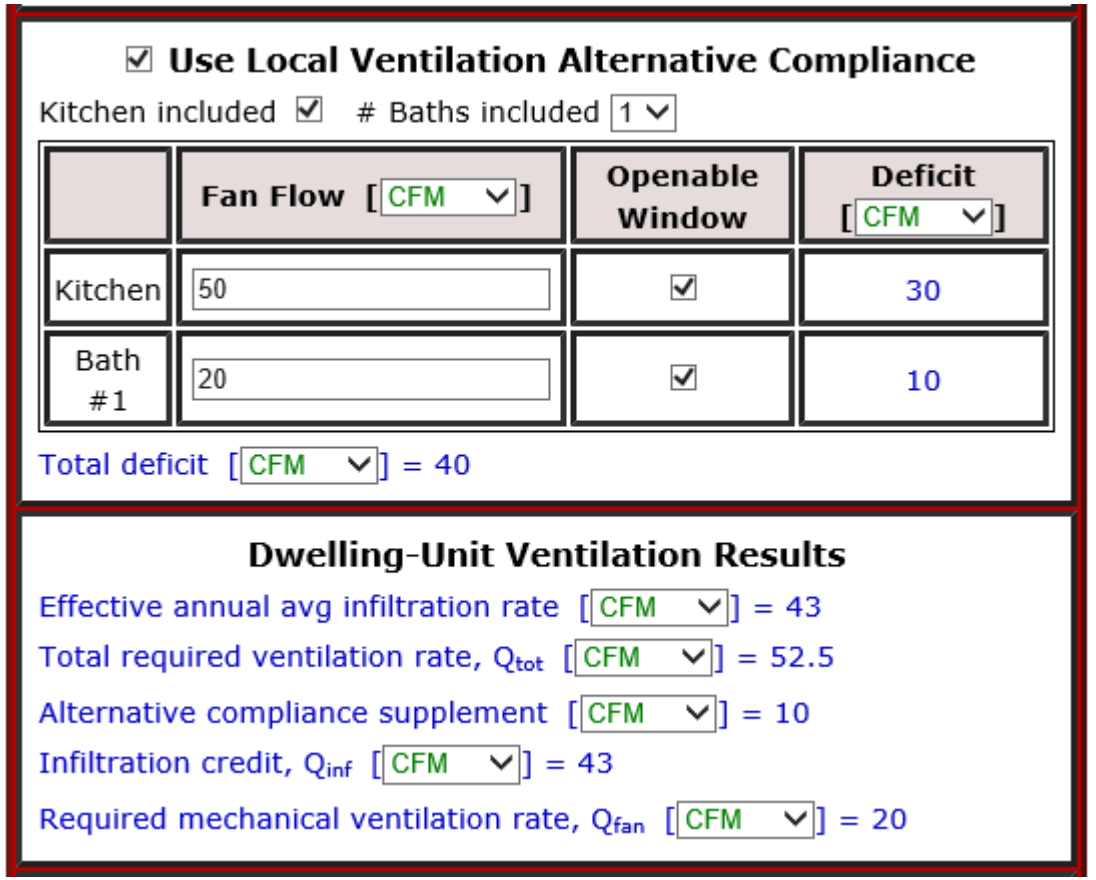
End units (3040-200)/3040=93.4% of credit a single family unit would get

Middle unit (3040-400)/3040=86.8% of credit a single family unit would get

WHATS NEW IN ASHRAE 62.2 2016

Multifamily Infiltration Credit





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WHATS NEW IN ASHRAE 62.2 2016

Multifamily Infiltration Credit

ASHRAE 62.2-2016 Ventilation — Reset | Print

New or existing construction: Existing

Dwelling unit is: Attached to other dwelling unit(s)

Only walls are in common with other dwelling units: Yes

Use infiltration credit: Yes

Closest weather station: United States / North Dakota / Devils Lake (AWOS)

Weather and shielding factor [1/hr] = 0.69

Floor area [ft2] 1000

Number of occupants: 3

Dwelling height [ft] 8

Area of common walls [ft2] 400

Envelope area adjoining garage [ft2] 0

Remaining envelope area [ft2] 2640

Total envelope area [ft2] = 3040

Measured leakage @ 50Pa [CFM] 1200

☑ **Use Local Ventilation Alternative Compliance**

Kitchen included ☑ # Baths included 1

	Fan Flow [CFM]	Openable Window	Deficit [CFM]
Kitchen	50	☑	30
Bath #1	20	☑	10

Total deficit [CFM] = 40

Dwelling-Unit Ventilation Results

Effective annual avg infiltration rate [CFM] = 43

Total required ventilation rate, Q_{tot} [CFM] = 52.5

Alternative compliance supplement [CFM] = 10

Infiltration credit, Q_{inf} [CFM] = 37

Required mechanical ventilation rate, Q_{fan} [CFM] = 25

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How do we meet the requirements of ASHRAE 62.2 2016

Other requirements in ASHRAE 62.2 2016

- **6.1 Adjacent spaces – statement in state plan that we will use blower door guided air sealing and infrared camera to ensure minimal air movement between conditioned space and garages, crawlspaces, attics, and other dwelling units**

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How do we meet the requirements of ASHRAE 62.2 2016

Other requirements in ASHRAE 62.2 2016

- 6.2 Instructions and Labeling – Instructions and education will be provided to the client on any new systems installed.
  - Labeling will be done as discussed earlier.

- 6.3 Clothes Dryers. Clothes dryers shall be exhausted directly to the outdoors

How do we meet the requirements of ASHRAE 62.2 2016

Other requirements in ASHRAE 62.2 2016

- **6.4 Combustion and Solid Fuel Appliances – we have a variance from DOE because our Worst Case Spillage test covers this**

- **6.5 Space Conditioning System Ducts – ducts outside the living space must be sealed and tested. No more leakage than 6% of total fan flow is allowed. May ask for a variance on this as it will be hard to achieve in a lot of our housing stock**

How do we meet the requirements of ASHRAE 62.2 2016

Other requirements in ASHRAE 62.2 2016

- **6.7 Minimum Filtration – supply air from outside must be filtered by a MERV 6 filter or better**

- **6.9 Carbon Monoxide Alarms – must be installed to NFPA 720 and local codes**

How do we meet the requirements of ASHRAE 62.2 2016

Other requirements in ASHRAE 62.2 2016

- **Remember – if the required mechanical ventilation is 15 cfm or less, no additional ventilation needs to be installed**

How do we meet the requirements of ASHRAE 62.2 2016

Other requirements in ASHRAE 62.2 2016

- The use of existing fans is allowed. You may have to install a new control and the fan control must be labeled.
  - I don't see this in the standard so I got an email from DOE saying this is allowed.
  - It would seem to allow kitchen range hoods to be used – we will not do this.
    - Possibly, if you started work and a client then says they do not want a fan installed.

How do we meet the requirements of ASHRAE 62.2 2016

Other requirements in ASHRAE 62.2 2016

TABLE 5.3 Prescriptive Duct Sizing

Duct Type	Flex Duct								Smooth Duct							
Fan Airflow Rating, cfm @ 0.25 in. of water (L/s @ 62.5 Pa)	50 (25)	80 (40)	100 (50)	125 (65)	150 (75)	200 (100)	250 (125)	300 (150)	50 (25)	80 (40)	100 (50)	125 (65)	150 (75)	200 (100)	250 (125)	300 (150)
Diameter [a], in. (mm)	Maximum Length [b,c,d], ft (m)															
3 (75)	×	×	×	×	×	×	×	×	5 (2)	×	×	×	×	×	×	×
4 (100)	56 (17)	4 (1)	×	×	×	×	×	×	114 (35)	31 (9)	10 (3)	×	×	×	×	×
5 (125)	NL	81 (25)	42 (9)	16 (5)	2 (0.6)	×	×	×	NL	152 (46)	91 (28)	51 (16)	28 (9)	4 (1)	×	×
6 (150)	NL	NL	158 (48)	91 (28)	55 (17)	18 (5)	1 (0.3)	×	NL	NL	NL	168 (51)	112 (34)	53 (16)	25 (8)	9 (3)
7 (175)	NL	NL	NL	NL	161 (49)	78 (24)	40 (12)	19 (6)	NL	NL	NL	NL	NL	148 (45)	88 (27)	54 (16)
8 (200) and above	NL	NL	NL	NL	NL	189 (58)	111 (34)	69 (21)	NL	NL	NL	NL	NL	NL	198 (60)	133 (41)

a. For noncircular ducts, calculate the diameter as four times the cross-sectional area divided by the perimeter.
b. This table assumes no elbows. Deduct 15 ft (5 m) of allowable duct length for each elbow.
c. NL = no limit on duct length of this size.
d. × = not allowed; any length of duct of this size with assumed turns and fitting will exceed the rated pressure drop.

How do we meet the requirements of ASHRAE 62.2 2016

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How do we meet the requirements of ASHRAE 62.2 2016

First we need good information to enter into the calculation – how do we get existing fan flows?

- **Exhaust Fan Flow Meter**
- **Averaging AirFlow Sensor**
- **Pitot tube**

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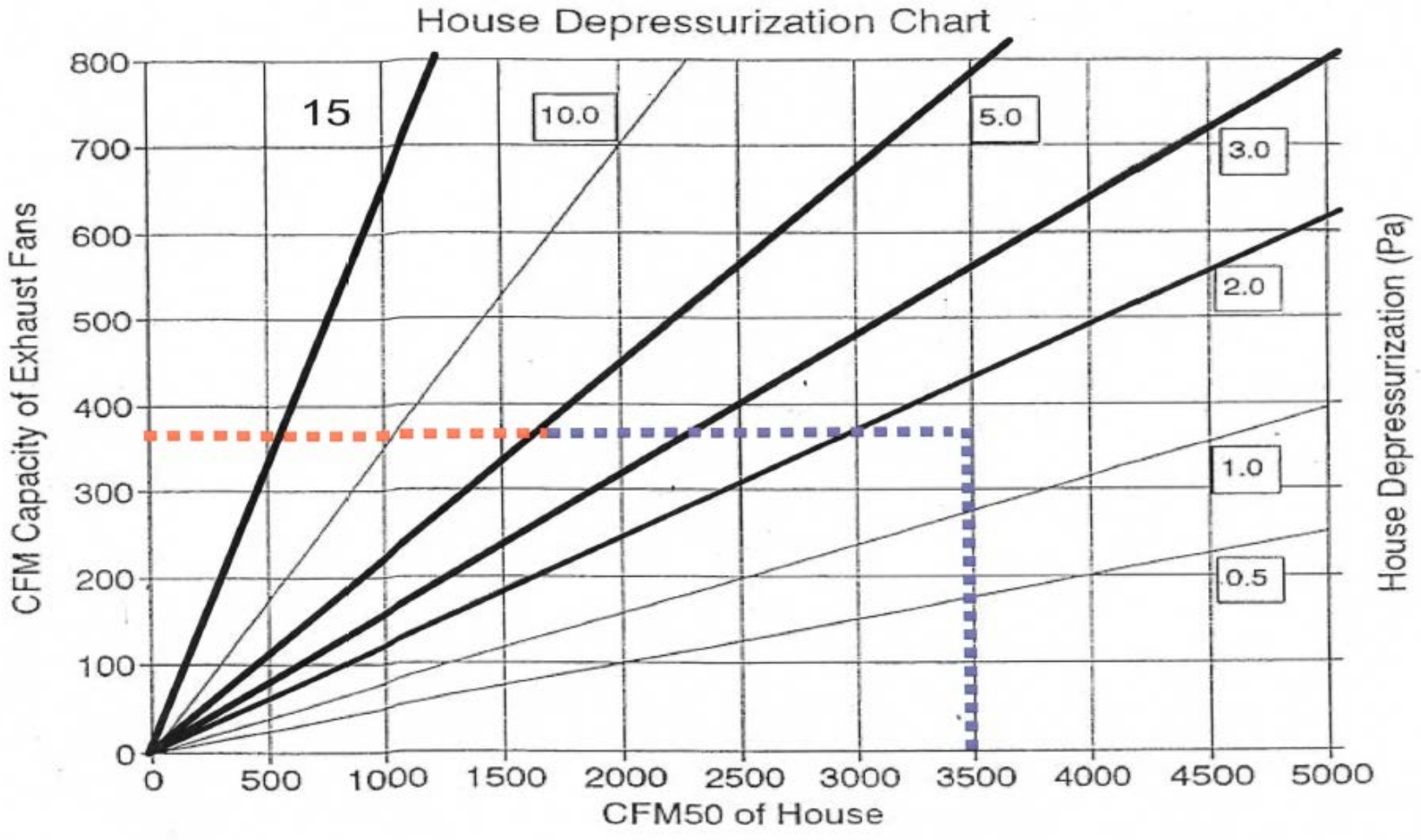
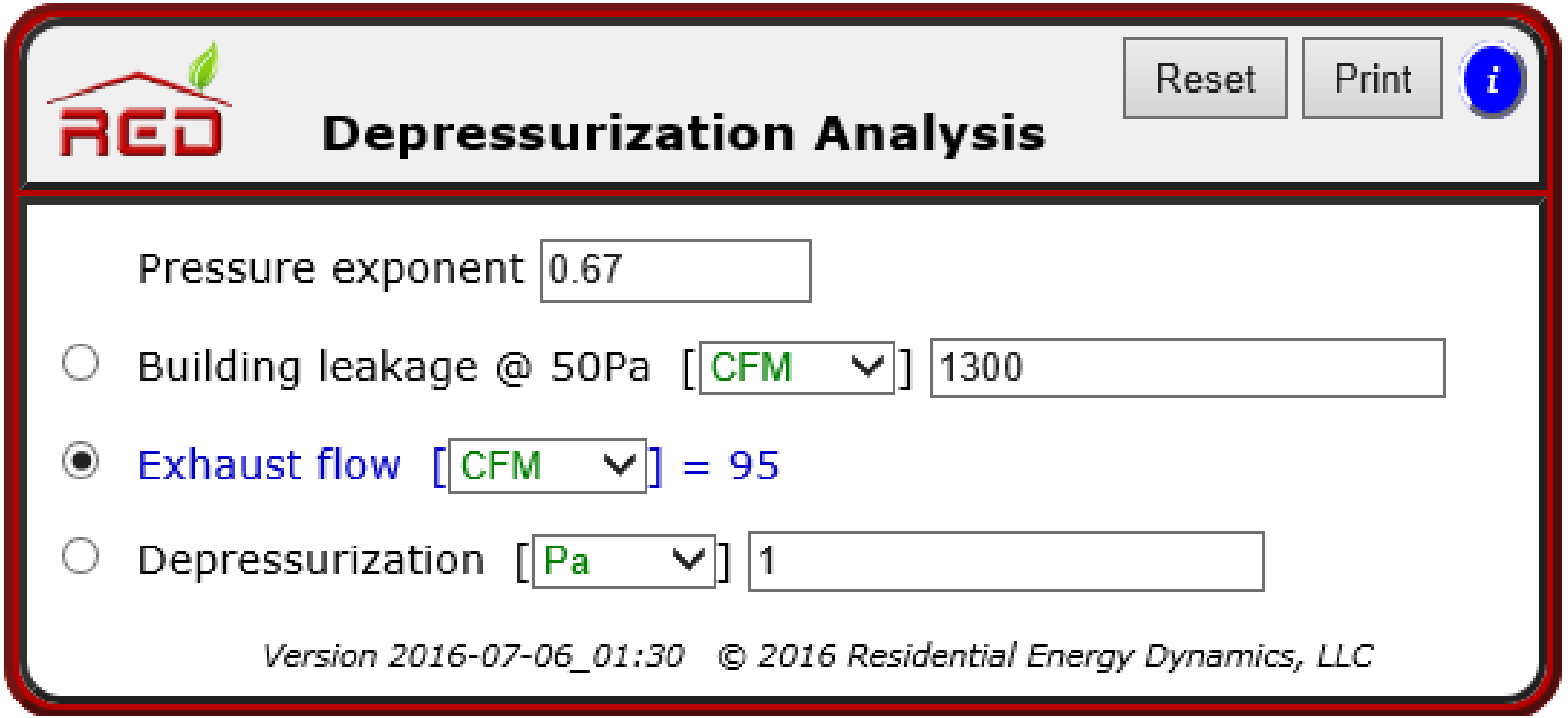
How do we meet the requirements of ASHRAE 62.2 2016

- **Blower Door method and chart**



How do we meet the requirements of ASHRAE 62.2 2016

- **RED Depressurization Analysis calculator**



How do we meet the requirements of ASHRAE 62.2 2016

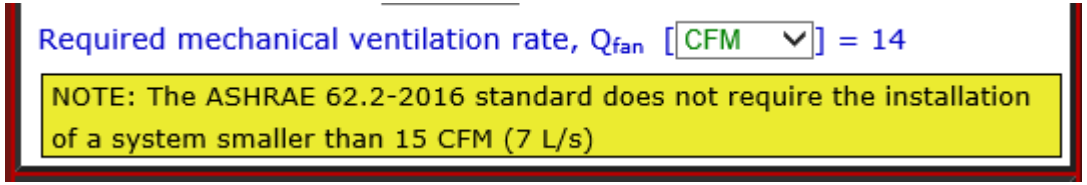
Where do we really want to add ventilation?

- Visible signs of problems – mold, stained walls and ceilings, pets, dirty carpets and furniture, evidence of water problems
- Odors – musty, damp, chemicals, pets (and everything that comes with them), smokers
- Tight houses – especially if they were leaky before weatherization
- Dwelling units that call for a high required ventilation rate

How do we meet the requirements of ASHRAE 62.2 2016

What if none of these problems exist and the standard is telling us we need a small amount of ventilation added?

- **Remember the 15 cfm rule**



- **Take a look at the local ventilation. Would it be easier to just add a better bathroom fan or kitchen fan?**
  - **Sone requirements do not have to be met when replacing existing local ventilation.**

How do we meet the requirements of ASHRAE 62.2 2016

What if none of these problems exist and the standard is telling us we need a small amount of ventilation added?

- **Normally we do not run the calculation more than once – it is not a pre and post reading like a blower door**
  - **The exception would be where the calculation was done upfront and the post blower door reading is lower than estimated. This will have a big effect on the required mechanical ventilation.**

How do we meet the requirements of ASHRAE 62.2 2016

What if none of these problems exist and the standard is telling us we need a small amount of ventilation added?

- **However, you can "play" with the calculation to see if there are some options that may lower the required mechanical ventilation.**
  - **Try adding some better local exhaust**
  - **Do not "play" with the blower door numbers – you should always air seal everything you can.**

How do we meet the requirements of ASHRAE 62.2 2016

Replacing a bathroom fan may lower the Alternative Compliance penalty

☑ **Use Local Ventilation Alternative Compliance**

Kitchen included ☑ # Baths included 1

	Fan Flow [CFM]	Openable Window	Deficit [CFM]
Kitchen	50	☑	30
Bath #1	10	☑	20

Total deficit [CFM] = 50

Dwelling-Unit Ventilation Results

Effective annual avg infiltration rate [CFM] = 46

Total required ventilation rate, Q_{tot} [CFM] = 52.5

Alternative compliance supplement [CFM] = 12.5

Infiltration credit, Q_{inf} [CFM] = 46

Required mechanical ventilation rate, Q_{fan} [CFM] = 19

☑ **Use Local Ventilation Alternative Compliance**

Kitchen included ☑ # Baths included 1

	Fan Flow [CFM]	Openable Window	Deficit [CFM]
Kitchen	50	☑	30
Bath #1	40	☑	0

Total deficit [CFM] = 30

Dwelling-Unit Ventilation Results

Effective annual avg infiltration rate [CFM] = 46

Total required ventilation rate, Q_{tot} [CFM] = 52.5

Alternative compliance supplement [CFM] = 7.5

Infiltration credit, Q_{inf} [CFM] = 46

Required mechanical ventilation rate, Q_{fan} [CFM] = 14

NOTE: The ASHRAE 62.2-2016 standard does not require the installation of a system smaller than 15 CFM (7 L/s)

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How do we meet the requirements of ASHRAE 62.2 2016

Replacing a kitchen range hood may also lower the Alternative Compliance penalty

☑ **Use Local Ventilation Alternative Compliance**

Kitchen included ☑ # Baths included 1

	Fan Flow [CFM]	Openable Window	Deficit [CFM]
Kitchen	50	☑	30
Bath #1	10	☑	20

Total deficit [CFM] = 50

Dwelling-Unit Ventilation Results

Effective annual avg infiltration rate [CFM] = 46

Total required ventilation rate, Q_{tot} [CFM] = 52.5

Alternative compliance supplement [CFM] = 12.5

Infiltration credit, Q_{inf} [CFM] = 46

Required mechanical ventilation rate, Q_{fan} [CFM] = 19

☑ **Use Local Ventilation Alternative Compliance**

Kitchen included ☑ # Baths included 1

	Fan Flow [CFM]	Openable Window	Deficit [CFM]
Kitchen	75	☑	5
Bath #1	10	☑	20

Total deficit [CFM] = 25

Dwelling-Unit Ventilation Results

Effective annual avg infiltration rate [CFM] = 46

Total required ventilation rate, Q_{tot} [CFM] = 52.5

Alternative compliance supplement [CFM] = 6.25

Infiltration credit, Q_{inf} [CFM] = 46

Required mechanical ventilation rate, Q_{fan} [CFM] = 12

NOTE: The ASHRAE 62.2-2016 standard does not require the installation of a system smaller than 15 CFM (7 L/s)

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How do we meet the requirements of ASHRAE 62.2 2016

Ok. We have to add ventilation. Where do we start? What do we take into consideration?

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How do we meet the requirements of ASHRAE 62.2 2016

What type of ventilation should we add?

- **Factors to take into consideration**
  - **Climate?**
  - **Dwelling type?**
  - **How much do we need to add?**
  - **Ease of installation?**
  - **Are there natural draft appliances that may have issues?**
  - **Is there available make up air?**

How do we meet the requirements of ASHRAE 62.2 2016

What type of ventilation should we add?

- Exhaust – most common in our program and in our climate
  - Advantages
    - Least expensive
    - Experience has taught us easier ways to install
    - Make up air gets some conditioning coming through the small cracks that we didn't air seal
    - Running a building a little negative in cold climates doesn't present moisture damage issues

How do we meet the requirements of ASHRAE 62.2 2016

What type of ventilation should we add?

- Exhaust – most common in our program and in our climate
  - Disadvantages
    - Have to be mindful of natural draft and power assisted draft appliances. It is not as big a problem as the original perception but it can be the tipping point on some systems – especially natural draft water heaters.
    - No way to address filtration of outside air. In some areas you may have to go long periods of time without using them.

How do we meet the requirements of ASHRAE 62.2 2016

What type of ventilation should we add?

- **Supply – hard to do in cold climates.**
  - **Used mostly in southern states**
  - **Where do you blow cold winter air into a house?**
  - **Will pressurize the home – could cause structural damage from moisture**
    - **Example – HVAC contractors like to run fresh air vents into the return ductwork – we have seen significant damage from this practice**

How do we meet the requirements of ASHRAE 62.2 2016

Lets try not to do this to any of our homes!

How do we meet the requirements of ASHRAE 62.2 2016

What type of ventilation should we add?

- **Balanced – the best when it can be done. More complicated and much more expensive**
  - **Can have the same issues as supply with where to add the cold fresh air.**
  - **If used with heating system ductwork it is hard to balance and requires complicated controls to meet the standard. Not many contractors have experience installing these.**

How do we meet the requirements of ASHRAE 62.2 2016

What type of ventilation should we add?

- **Balanced – the best when it can be done. More complicated and much more expensive**
  - **Sometimes may be the only option or the cheapest option – example - having to replace other appliances**
  - **In very tight homes make up air may have to be brought in for exhaust fans to work like they should. In this case it makes more sense to use heat recovery or energy recovery ventilators.**

How do we meet the requirements of ASHRAE 62.2 2016

So we have decided that exhaust ventilation is the best option for the dwelling unit. How do we decide where to install it?

- **What type of construction?**
  - **Home with basement that is conditioned or semi-conditioned**
  - **Home with conditioned crawlspace or semi- conditioned**
  - **Home on slab**
  - **Combinations**

How do we meet the requirements of ASHRAE 62.2 2016

So we have decided that exhaust ventilation is the best option for the dwelling unit. How do we decide where to install it?

- **Where in the house is the worst air?**
  - **Bathroom? Kitchen?**
    - **Mostly moisture issues, some odor, gas ranges**
    - **Should be covered by local ventilation**
  - **Basement? Crawlspace?**
    - **In our climate and housing stock, basements are the most common type of construction, some crawlspaces**

How do we meet the requirements of ASHRAE 62.2 2016

So we have decided that exhaust ventilation is the best option for the dwelling unit. How do we decide where to install it?

- **Basements and Crawlspaces**
  - **Moisture issues, storage (chemicals), furnaces and water heaters, radon**
  - **In our program, basements and crawlspaces are the hardest to air seal so air leakage becomes a factor**
  - **With crawlspaces you do have an option to condition them and seal them off from the rest of the house – many times it is hard to do**

How do we meet the requirements of ASHRAE 62.2 2016

So we have decided that exhaust ventilation is the best option for the dwelling unit. How do we decide where to install it?

- **The house needs to be set up so all levels communicate with each other – the fan needs to be able to pull from all levels**
  - **In my experience, many programs opt for installing the fans on the main floor or second floor. The preferred method seems to be replacing a bathroom fan with a low sone, dual function fan.**

How do we meet the requirements of ASHRAE 62.2 2016

So we have decided that exhaust ventilation is the best option for the dwelling unit. How do we decide where to install it?

- **The house needs to be set up so all levels communicate with each other – the fan needs to be able to pull from all levels**
  - **In this case if the fan is installed on the main floor or above, it will pull air from the basement up into that part of the living space. Because of the air leakage in the basement it will dilute the pollutants down there, but air quality on the main floor (and above) will be negatively affected.**

How do we meet the requirements of ASHRAE 62.2 2016

So we have decided that exhaust ventilation is the best option for the dwelling unit. How do we decide where to install it?

- **We have seen this in the past when installing fans in the main or even second floor bathrooms. Clients have called and complained of musty smells that were not present before. It stands to reason that if we are pulling musty air up from the basement, it is also carrying the other pollutants as well.**

How do we meet the requirements of ASHRAE 62.2 2016

So we have decided that exhaust ventilation is the best option for the dwelling unit. How do we decide where to install it?

- **This is why it makes sense in a lot of our housing to install exhaust ventilation in the basement.**
  - **Good results after a lot of units done**
  - **Ease of installation – open ceilings, short duct runs, wire in extension cord and label it**

How do we meet the requirements of ASHRAE 62.2 2016

So we have decided that exhaust ventilation is the best option for the dwelling unit. How do we decide where to install it?

- **This is why it makes sense in a lot of our housing to install exhaust ventilation in the basement.**
  - **While this is not radon mitigation, it stands to reason that if we are helping with other pollutants, radon concentrations will be less. We still must be careful not to run the space to negative.**

How do we meet the requirements of ASHRAE 62.2 2016

So we have decided that exhaust ventilation is the best option for the dwelling unit.

- **Some other types of exhaust ventilation used in basements**
  - **Inline fans can be used with ductwork to provide some source point and whole house ventilation**

How do we meet the requirements of ASHRAE 62.2 2016

So we have decided that exhaust ventilation is the best option for the dwelling unit. How do we decide where to install it?

- **Crawlspaces – gets a little more difficult**
  - **You can install the same kind of system**
    - **Crawlspace must be insulated and sealed with ground cover. It must also communicate with the rest of the house.**
    - **Inline fans can be a good option where basement and crawlspace combinations exist.**

How do we meet the requirements of ASHRAE 62.2 2016

So we have decided that exhaust ventilation is the best option for the dwelling unit. How do we decide where to install it?

- **Slab on grade – go with main floor or above**
  - **Dual function bath or kitchen range hoods**
  - **Centrally located**
  - **Again, if house is really tight, exhaust fans may not work as well**

How do we meet the requirements of ASHRAE 62.2 2016

So we have decided that exhaust ventilation is the best option for the dwelling unit. How do we decide where to install it?

- **Manufactured Homes**
  - **Options include – through the wall fans, ceiling exhaust fans, dual function bath and kitchen range hoods**
  - **Decide what is existing and use the easiest method**

How do we meet the requirements of ASHRAE 62.2 2016

So we have decided that exhaust ventilation is the best option for the dwelling unit. How do we decide where to install it?

How do we meet the requirements of ASHRAE 62.2 2016

So we have decided that exhaust ventilation is the best option for the dwelling unit.

- **A lot of options for exhaust ventilation**
  - **Try to keep it simple**
    - **It will be easier for you and easier for the client to understand**
    - **Use a fan with cfm that meets the required mechanical ventilation as close as possible**
    - **Fans that are out of sight don't get turned off as often**

How do we meet the requirements of ASHRAE 62.2 2016

So what if balanced ventilation is the best option for the dwelling unit.

- A lot of options for balanced ventilation
  - Heat recovery ventilator
  - Energy recovery ventilator
  - Smaller units with no heat recovery
    - Adds supply (make up air)
    - Some shut off the supply air under 30 degrees

How do we meet the requirements of ASHRAE 62.2 2016

So what if balanced ventilation is the best option for the dwelling unit.

- **Remember that even though they are more energy efficient, the air brought in from outside will still be much colder than inside air. You have to find a way to buffer the colder air by mixing it with inside air.**
  - **Best way we have found is to install it in a return – preferably down line from the furnace. The returns for the unit can be used like the inline fan. Placement can be in the basement and used like source point local exhaust.**

How do we meet the requirements of ASHRAE 62.2 2016

So what if balanced ventilation is the best option for the dwelling unit.

- **The problem with using furnace ductwork is that by adding the fresh air to the return, it acts like a duct leak and can pressurize the house.**
  - **Dampers need to be used to shut off the air when the furnace runs. This means it is hard to meet ASHRAE because it is depending on the furnace to tell it how long it runs.**

How do we meet the requirements of ASHRAE 62.2 2016

So what if balanced ventilation is the best option for the dwelling unit.

- **To get around this problem, special controls have to be installed to balance pressures when the furnace runs and when it is off. Very complicated and very expensive.**
  - **Best if you can get by without using the ductwork.**

- **If you need to install balanced ventilation, I would recommend talking with us first.**

How do we meet the requirements of ASHRAE 62.2 2016

How do we meet the requirements of ASHRAE 62.2 2016


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Questions?

Thank You!

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