

RADON MITIGATION SYSTEMS

External or Internal Mounted Radon Fans

PROS & CONS

of

SCIENCE versus AESTHETICS?

or

HEALTH & SAFETY versus AESTHETICS?

By

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This article is written in laymen's terms and not scientific terms to explain the pros and cons of external versus internal mounted fans.

A radon mitigation system is designed to change a highly negative air pressure in a basement to slightly negative to neutral air pressure. In the case of a slab home it is the first floor. Yes, that is correct, slab homes have radon gas. All homes have radon gas. How much? All homes should be tested. No exceptions.

External mounted fans are attached to the outside of the home. Internal mounted fans are located in non-habitable spaces for example above a garage or above the highest living area such as an attic. Please consult your state or licensed radon contractor for exact definitions of correct locations.

Here is a list of basic physics concepts to remember during this article:

- 1) Four (4) inch pipe is preferred over a three (3) inch pipe in most Radon Mitigation Systems (RMS). (4 inch pipe surface area is 12.566 square inches & 3 inch pipe surface area is 7.069 square inches).
- 2) Reducing from a four inch to three inch pipe reduces airflow by over 20%.
- 3) Each 90 degree bend is equal to adding over ten (10) foot of pipe. Sharp 90's add even more.
- 4) Two 45 degree bends are more efficient than one 90 degree bend.
- 5) There is friction from the air within a pipe.
- 6) External static electricity may be created from friction in a pipe.
- 7) Soil air temperature under a slab is approximately 55 degrees Fahrenheit.
- 8) Soil air normally has high moisture content.

A well engineered radon system minimizes the number of pipe bends. Basically, the fewer the bends, the better the flow of gas through the system because there is less friction. The better the flow of gas through the system the greater the volume of gas is moved through the system. The greater the volume of gas moved has multiple benefits. What are those benefits? The radon mitigation fan may be able to be downsized both mechanically and physically. If there is less load on the fan, it will run more efficiently resulting in less energy consumption and the fan service longevity/efficiency will be extended. In combination with several other factors in a RMS the noise and harmonics will be reduced. The ALARA (As Low As Reasonably Achievable) is a radiation protection term we will discuss in another article. BUT the major goal is to have the lowest achievable radon measurement reducing health risks.

Internal Mounted Fan Pros:

- 1) Aesthetically they are nicer looking. The exhaust port looks like another soil stack on the roof.

Internal Mounted Fan Cons:

- 1) The fan switch must be visible and within 6 foot of the radon fan (code).
 - a. How accessible is the fan switch?
 - b. How long will it take to get to the fan switch?
- 2) The fan is a continually operating electrical piece of equipment.
 - a. How easy is it to visually inspect the fan?
 - b. How easy is it to service the fan?
- 3) The fan exhaust stack must penetrate the roof creating one more opportunity for a roof leak.
 - a. Why do professionals such as contractors, architects, plumbers and roofers attempt to minimize the number of roofing openings?
- 4) The inside pipe air temperature is 55 degrees Fahrenheit. On a hot summer day, the storage area might be 100 degrees hotter.
 - a. Will your pipes potentially sweat on a high humidity day? Yes
 - b. Will that moisture potentially drop on the drywall below? Yes
 - c. Does drywall support organic growth? Yes (It is a great Petri dish).
 - d. Will you potentially have organic growth (mold)? Yes
 - e. Do mold mitigation contractors attempt to remove sources of moisture? Yes
- 5) Some internal mounted fan systems require piping to be routed through rooms.
 - a. Do you want plastic piping running through your closets?
- 6) The majority of internal mounted fan systems require piping to run through garages.
 - a. How much static electricity is being created on the internal pipes?
 - b. Where do a high percentage of home fires and explosions occur?
 - c. Are there gasoline and other chemicals stored in your garage?
 - d. Do you park gasoline powered cars in your garage?
 - e. Does your insurance company approve of a plastic pipe (chimney) in your garage?
 - f. How long will radon pipe fire seals delay the spread of fire throughout the home?
- 7) How many 90 degree bends and how many 45 degree bends in an internal mounted fan RMS?
 - a. The minimum number of 90 degree bends is normally four and one or two of those are a sharp 90 degree bends.
 - b. The average system has six 90 degree bends.
- 8) What is the vertical pipe length ratio to horizontal pipe length ratio? The higher the better.
 - a. Will more water pool in horizontal piping versus vertical piping? Yes
 - b. Will the dehumidification benefits from horizontal piping dramatically diminish? Yes
A well engineered system will remove one gallon of water every two hours.
 - c. Will air flow be lessened from a lower ratio? Yes
 - d. Refer: Air Discharge Velocities, American Conference of Governmental Industrial Hygienists ACGIH 2004 Industrial Ventilation A Manual of Recommended Practice 25th Edition, Cincinnati, Ohio
- 9) What is the elevation of from the ground on an internal versus external fan exhaust pipe?
 - a. The higher the level the better. Consider the exhaust plume.
 - b. Have you considered the benefits of the Bernoulli effect.

External Mounted Fan Cons:

- 1) They are not as aesthetically pleasing.
 - a. Is your gas meter mounted on the outside of your home? Why?
 - b. Is your electric meter and water meter mounted on the outside of your home?
 - c. Is your satellite dish mounted on the outside of your home?
 - d. Is your air conditioner mounted on the outside of your home?
 - e. Are your downspouts mounted on the outside of your home?
- 2) The fans will freeze-up in the winter.
 - a. The exhaust air temperature is 55 degrees Fahrenheit.
 - b. Where do you live?

External Mounted Fan Pros:

- 1) The fan switch is easily and immediately accessible and next to the fan.
- 2) Visual inspection and servicing the fan is convenient.
- 3) No roof penetration.
- 4) No pipe condensation.
- 5) No plastic pipes running through other flow of your home.
- 6) Fire & Smoke hazard diverted to the outside of the home.
- 7) Minimal number of bends improving efficiency.
 - a. The minimum number of 90 degree bends is zero but normally there are two.
 - b. The minimum number of 45 degree bends is two but normally there are four.
- 8) Higher vertical pipe to horizontal pipe ratio.
 - a. More efficient airflow lowering radon gas levels.
 - b. Higher levels of dehumidification
 - c. Efficient airflow not working the fan motor as hard and saving electricity.

In an attempt to KISS (Keep it simple):

Why do you want a Radon Mitigation System?

For your health?

What radon levels do you want to achieve?

Have you evaluated all of the safety issues?

What system will be achieve and best address all of your health and safety issues?

About this published author:

University degreed Brian R. Roy educates the community in laymen's terms on technical matters. He has been a federally approved expert witness and has a depth of practical knowledge of over forty years in residential and commercial maintenance. Mr. Roy has appeared on television and has been the featured expert radon spokes person on radio with the nationally syndicated home improvement talk show host Gary Sullivan (www.GarySullivanOnline.com) Since Mr. Roy's father and uncle passed away from lung cancer his passion is educating people on the health hazards of radon gas and installing well engineered and practical radon mitigation systems in homes. He educates consumers on environmentally friendly / "green" cleaning products. For further information, regulations, standards, education and links please research: www.OhioRadonPro.com