



# TECHNOLOGY NOTES

## SecureAire Technology & Radon Gas

SecureAire has developed the most advanced and optimized Electronically Enhanced Air Purification System in today's marketplace. Prior to today, the market has provided devices that are mostly substandard and only partially deliver the performance and benefits that have been advertised.

SecureAire's Advanced Collector System (ACS) is a very efficient and effective air purification system that utilizes Particle Control Technology. It is composed of three parts, a Particle Conditioning System, a Collector System and a Collider System. These three parts together create today's single most efficient and effective particle control entity.

The ACS optimizes both ionization and polarization to collect small particles, TVOCs and gases very effectively. Unlike conventional filters the ACS, with its electronic characteristics, exhibits superior performance and is non selective in reducing and or removing all types of contaminants. The ACS conditions contaminants to adhere to the media material or other particles, which subsequently get captured. Utilizing and optimizing electric fields and charge to ionize/polarize contaminants as well as polarize the internal media material in the system, results in a significant reduction in airborne contamination. The ACS System also provides the critical aspect of pathogen inactivation thru the use of INACTIVATE™ Technology. INACTIVATE reduces viable organisms ability to grow and provides the necessary voltage strength to oxidize and kill viable airborne pathogens including mold.

Initially, SecureAire used Particle Accelerated Collision Technology (PACT) to agglomerate particles, as well as condition particles to adsorb and absorb gases and odors in the room environment. These particle agglomerates are then brought back to the HVAC filter where they were captured. PACT is utilized to make any filter more effective.

Today, as part of the ACS System, the Collider performs this same function. However, by combining the Collider with the PCU and Collector, the ACS System agglomerates and very effectively collects, adsorbs, adsorbs and inactivates these particles, gases, TVOCs, odors and viable airborne pathogens.

### Radon Gas

The heaviest known gas in the world is Radon (Rn). Radon is a naturally occurring radioactive gas and comes from the natural breakdown (radioactive decay) of uranium. It occurs naturally as an intermediate step in the normal radioactive decay chain through which Thorium and Uranium slowly decay into Lead. Radon is a decay product of Radium. Its most stable isotope,  $^{222}\text{Rn}$ , has a half-life of 3.8 days. Thorium and Uranium are two of the most common radioactive elements on Earth. Radon is usually found in igneous rock and soil, but in some cases, well water may also be a source of radon.

The atomic radius of Radon is 1.34 Å (small). It is a single atom gas, which makes it easy to penetrate into your lungs. **Radon is the number ONE cause of lung cancer among non-smokers.** It produces Alpha particles that are emitted and cause damage to the DNA of Lung tissue. Most damaged cells are killed, however, some cells are partially damaged and replicate. These cells are the main cause of lung cancer.

## SecureAire Effectiveness and Radon Gas

As previously discussed, SecureAire's Technology is based upon the use of electromagnetic fields to control the transport mechanisms of particles, regardless of their size. Again, this process utilizes ionization, both negative and positive, polarization and particle acceleration technology, which create larger "net neutral" particles. It is the "net neutral" particle that enables all airborne contamination to be agglomerated, adsorbed, and finally collected into the filter matrix or exhausted. In addition, this process provides the ability to inactivate or kill any captured and viable pathogen.

Radon is a naturally occurring radioactive gas formed by the natural breakdown of Uranium.

In a number of formal studies focused on the reduction of Radon gas, consensus states that a combination of the four methods listed below have shown reductions between 67-95%.

- 1. Stop the source from entering the occupied space.**
- 2. Use a fan in the occupied space**
- 3. Create ions in the occupied space.**
- 4. Absorb and Adsorb the gas into other particles.**

The following paragraph is taken from an IAEA/INIS report:

"The potential of ion generators to remove radon decay products from the airspace of residences or mines was investigated both experimentally and theoretically. A positive ion generator, producing an air ion current of less than 2  $\mu\text{A}$  and operated in a 78  $\text{m}^3$  chamber with air exchange rates ranging from 0.2 to 0.8- $\text{hr}^{-1}$  and relative humidities ranging from 20 to nearly 100%, reduced the concentrations of airborne radon decay products by as much as 85%. A negative ion generator, operated under the same range of conditions, was less effective, producing airborne radon decay product removals up to 67%. Experimental results compared favorably with a simple theoretical model that hypothesizes a three-part process: 1) radon decay products, as well as aerosol particles to which some of these decay products attach, are charged by diffusion of the air ions produced by the generator; 2) the air ions also produce a nonuniform space charge in the chamber that results in an electric field gradient radially outwards from the generator to the chamber surfaces; and 3) because of the influence of this electric field, the charged decay products and particles migrate toward nearby surfaces where they plate out. The net benefit of unipolar space charging is a substantial decrease in the steady-state radon decay product concentrations in the airspace with a corresponding reduction in the lung dose equivalent to the occupants"

In another example, a report written by the Harvard School of Public Health along with the Health Laboratory of Brooks Air Force Base shows that enhanced convection (a fan) and space charging provided reductions of up to 95% in Potential Alpha Energy Concentrations (PAECs).

The SecureAire ACS System utilizes both positive and negative electric fields in its operation to control particle behavior. "Conditioned" particles that make it through the ACS are largely neutral in nature, however macroscopically a level of ionization can reach the treated space. It is this level of controlled ionization that will reduce the level of radon gas in a treated space.

### **"SecureAire Technology Does Not Create Radon Gas but Actually Removes It!"**

For further information or questions, please do not hesitate to contact your local SecureAire Representative or SecureAire direct.

