

# An RGF Commercial Grade Ionized Advanced Oxidation Technology



# REME+™

# Reflective Electro-Magnetic Energy A Guardian Air™ Product

Professional installation required

## The main advantage...

REME does not need the pollutants to travel to the air handler for UV treatment or filtration. REME is proactive and sends ionized aggressive advanced oxidizers into the room to destroy the pollutants at the source, in the air and on surfaces, before they can reach your family, clients or employees.

## Validation

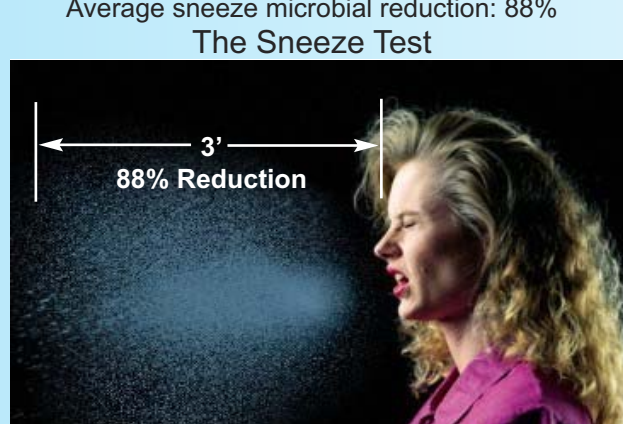
RGF first developed its Advanced Oxidation Technology over 20 years ago. Over 1 million RGF Cells are in use around the world. RGF has licensed its technology to many Fortune 500 companies for use in the medical, food, military, residential, commercial, marine, hospitality and government, etc. RGF cells in various products have been tested and approved/registered by:

- UL, ETL, TUV, EU & CSA
- U.S. Military
- Chinese Government
- Japanese Government (TV commercials)
- Canadian Government
- U.S. Government – GSA
- European Union

In addition, RGF technology has been specified in the Norovirus/MRSA protection plan of America's largest restaurant chains, hotel chains, theme parks, cruise lines, public schools and hospitals.

REME+™ sends Ionized Advanced Oxidants throughout the room to kill microbials at the source.  
Average sneeze microbial reduction: 88%

## The Sneeze Test



Simulated Sneeze Lab Test at three feet in a 250 cu ft Bio Test Chamber. An independent double blind study.

**GASES & ODORS**  
Up to 99%

**MICROBIALS**  
Up to 99.99%

**PARTICULATE**  
Up to 93% of .3 micron

**RGF's Aggressive Advanced Oxidizers travel throughout the room attacking pollutants**

Note: The RGF AOT Cell is not a medical device and no medical claims are made.

## Safety

It is a normal reaction to question the long term safety of any product that is effective and uses new or "breakthrough" technology. This type of question has become common as our litigious society has taught us to question things that significantly outperform existing methods or products.

The breakthrough in the RGF advanced oxidation technologies is a group of oxidants known as Hydroperoxides. Hydroperoxides have been a common part of our environment for over 3.5 billion years. Hydroperoxides are created in our atmosphere whenever three components are present: oxygen molecules, water vapor and energy (electro magnetic). REME+™ also has the ability to super charge these hydroperoxides or ionize them into Ionized-Hydro-Peroxides™.

Ionized-Hydro-Peroxides are very effective at destroying harmful microbials. As oxidants, they do this by either destroying the microbe through a process known as cell lysing or by changing its molecular structure and rendering it harmless (which is the case in VOC's and odors). The amount of hydroperoxides required to accomplish this task in a conditioned space is well below the level that is constantly in our outside air. The Advanced Oxidation Technology found in RGF's Guardian Air product family has brought the oxidants found in the outside air into the conditioned space of your home.

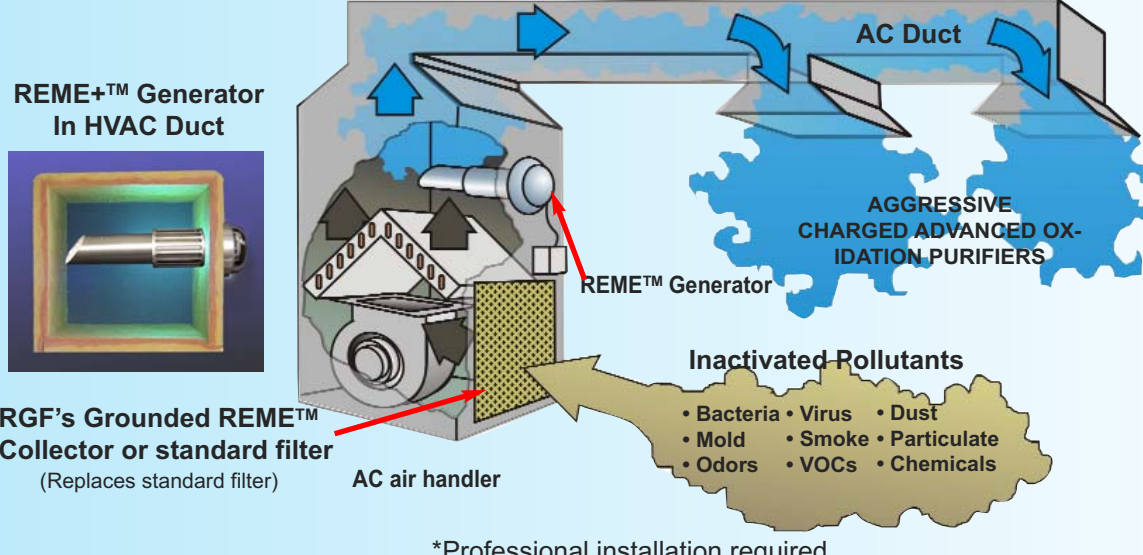
There is no known case of hydroperoxides ever creating a health risk. Considering we have been exposed to hydroperoxides in nature since the day man stepped on the planet, it is a reasonable assumption that hydroperoxides do not constitute a health risk. Over the past 20 plus years RGF has more than 1 million Advanced Oxidation products successfully used worldwide without a safety problem.

## RGF's Advanced Oxidation Test Results

Samples of university, independent lab tests and major corporation studies

- ISO-Level 3 particulate reduction in a bio-chamber (better than HEPA Filtration)
- 4-log reduction (99.99%) surface bacteria/virus reduction
- Over 80% VOC reduction
- 88% of microbes in human sneeze killed at 3 feet
- 97% airborne bacterial reduction
- 99% reductions of Ecoli, Listeria, Strep and Bird Flu
- 85% odor reduction
- 97% airborne mold reduction
- US Military approved for mold protection in field hospitals
- Hospital approvals Infectious Diseases - U.S. and International 99% reduction of Staph (MRSA)
- 99% food surface microbial reduction
- Major US city school reports 20% reduction in absenteeism
- Tested and approved by the Chinese Government for protection against the SARS virus
- Approved by the USDA, FSIS and FDA for use in food processing plants
- Fox News three-part indoor air series featured RGF and concluded substantial mold and bacteria reductions
- RGF's Advanced Oxidation technology has been featured on Fox, ABC, CBS and in Popular Science Magazine

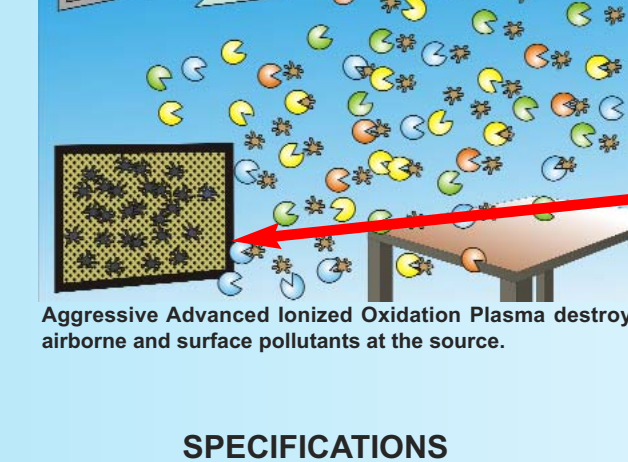
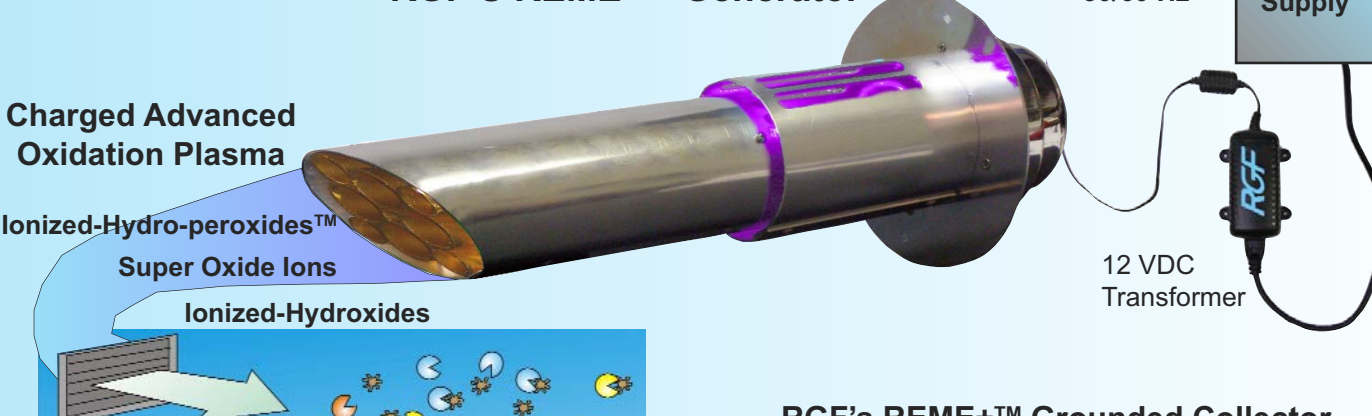
## RGF's REME+™ Technology



## REME™

With a REME+™Generator Advanced Oxidation System, micro-organisms can be reduced by over 99%. Gases, VOCs, odors and particulate (dust) can also be reduced significantly. Charged Advanced Oxidation Plasma will be carried throughout the ducts and rooms for a continuous purification process and a quick kill of newly introduced odors or microbials.

## RGF'S REME+™ Generator



**RGF's REME+™ Grounded Collector**

Statically attracts particulate and dust - 93% of particulate .3 microns and above. Cleanable/reusable, low pressure drop, no more than a standard factory recommended air filter.

**OPTION:** REME+™ can be used with a standard filter with results of approximately 73%.

## SPECIFICATIONS

### Advanced Oxidation Plasma .01ppm:

- Ionized-Hydro-Peroxides
  - Super Oxide Ion distribution
  - Ionized Hydroxide distribution
- Distributed through air handler

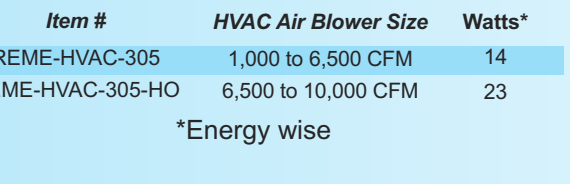
### Installation

Installed in hvac duct, plenum

### Electrical

110-220 VAC 50/60 Hz

**Warranty on parts 30,000 hrs\* (3.5 Year)**  
**(USA only) \*Continuous Operation**



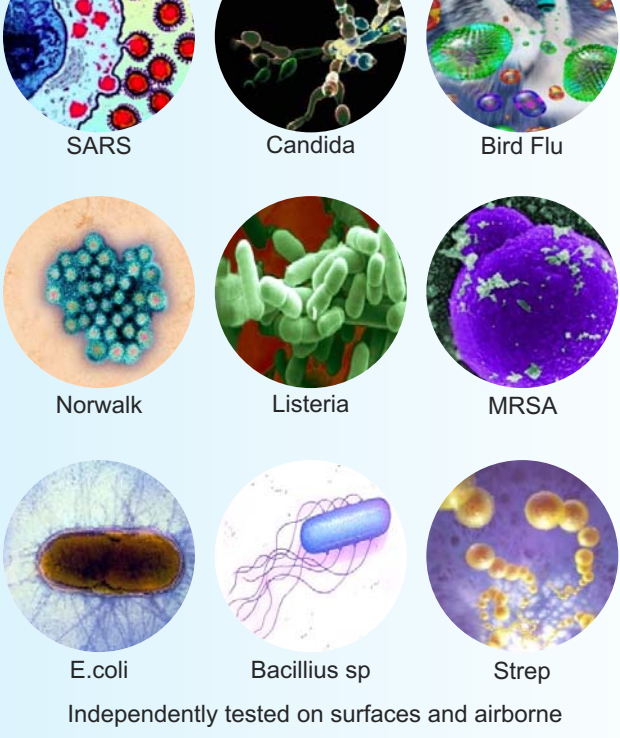
Item #	HVAC Air Blower Size	Watts*
REME-HVAC-305	1,000 to 6,500 CFM	14
REME-HVAC-305-HO	6,500 to 10,000 CFM	23

\*Energy wise

**To calculate CFM from tonnage rating:**  
As a general rule 400 CFM = 1 ton unit  
Example: 5 ton x 400 = 2000 CFMs

## Microbial Reductions

Typical virus and bacteria killed



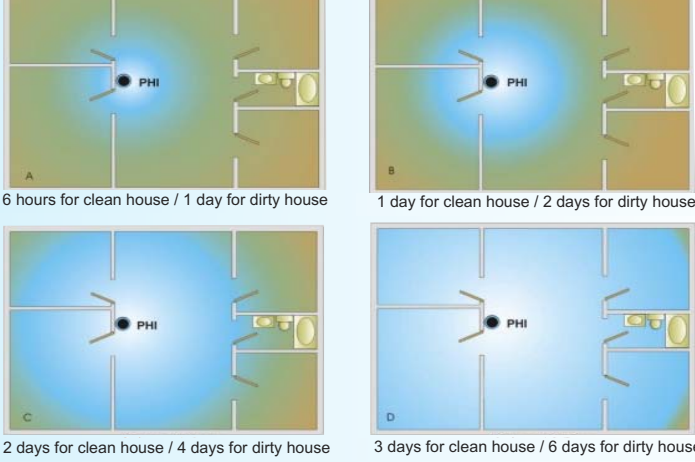
Independently tested on surfaces and airborne

## Sneeze Simulation Machine



A meeting was held at RGF after 9/11/01 with a team of PhDs from Sandia National Lab who hold homeland security responsibility for microbials (bacteria/viruses) terrorist attacks. The team headed by Dr. James Marsden, a distinguished professor from Kansas State University, needed a method to kill micro-organisms in a heating/air conditioning or ventilation system. The scenario was: What if a terrorist aspirated a deadly strain of bacteria or virus in a public area? No one would know until people had dispersed all over the U.S.A. and spread the disease into a pandemic. RGF scientists interjected that if the kill was made in the heating, cooling or ventilation system (HVAC), it is really too late as anyone in the room when the terrorist aspirated the bacteria/virus would already be exposed and moving around the country. RGF proposed a proactive approach of airborne aggressive friendly oxidizers such as hydro-peroxides. These could intercept the aspirated bacteria/viruses within inches of the aspirator and begin neutralizing the microbes immediately. We used a sneeze as an example, such as: What if I sneeze right now? Everyone around the table would be exposed to my aspirated sneeze germs, and if the HVAC system had a sanitizer, it would be of no help to those around the table. This, of course, was of great interest to the Sandia team, but they

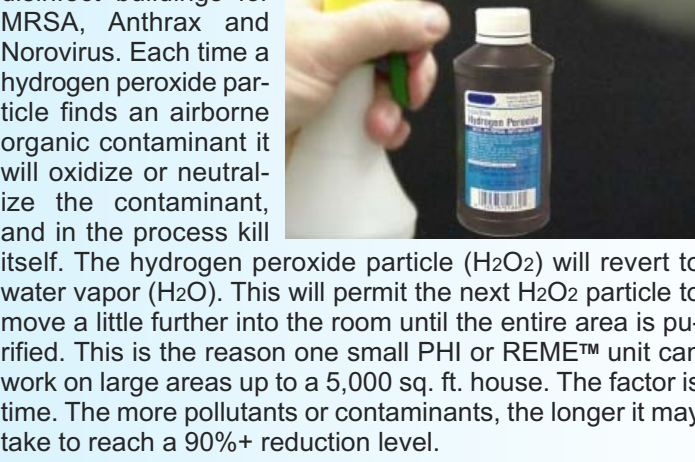
signed and built the world's first sneeze machine which included an artificial lung, pressure, speed and volume controls. The test proceeded with outstanding results. An average of 78% reduction of microbials was achieved in a double blind test, at 3 feet from the sneeze source. These results were later improved by REME utilizing Ionized Hydro-peroxides. This is clearly not a medically supervised test or protocol. However, from a practical point, it was definitely providing some kill at the source and will provide some level



of protection. The physics of PHI and REME™ as an air purifier is unique. A PHI or REME™ System is not a filter, a UV device or an ozone generator. It is a cell that radiates friendly oxidizers. These oxidizers travel through a room or home by Brownian Motion (natural air movement). One of the four PHI oxidizers is hydro peroxides and Ionized Hydro-peroxides for REME™. In layman's terms, treating a room with hydro peroxides is like misting a room with a weak hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) mist similar to the old homeopathic remedy for sick kids when you added a couple of ounces of hydrogen peroxide to a vaporizer to disinfect the room. Today sophisticated hydrogen peroxide systems are used professionally to disinfect buildings for MRSA, Anthrax and Norovirus. Each time a hydrogen peroxide particle finds an airborne organic contaminant it will oxidize or neutralize the contaminant, and in the process kill itself. The hydrogen peroxide particle (H<sub>2</sub>O<sub>2</sub>) will revert to water vapor (H<sub>2</sub>O). This will permit the next H<sub>2</sub>O<sub>2</sub> particle to move a little further into the room until the entire area is purified. This is the reason one small PHI or REME™ unit can work on large areas up to a 5,000 sq. ft. house. The factor is time. The more pollutants or contaminants, the longer it may take to reach a 90%+ reduction level.



needed proof it worked. So, we needed a double-blind study on RGF's PHI Advanced Oxidation Plasma's ability to destroy sneeze germs. This required a nice chamber and the ability to accurately duplicate a sneeze, not an easy task. A testing protocol concept was discussed and developed which included a "Sneeze Simulation Machine" and "sneeze" chamber. A sneeze can travel at up to 100 mph, so we had to consider lung capacity, sneeze pressure, and liquid volume to properly simulate a human sneeze. RGF de-



**OXIDIZERS (In order of strength)**

1. Fluorine
2. Hydroxyl Radical\*
3. Ozone
4. Hydrogen Peroxide\*
5. Permanganate
6. Chlorine
7. Bromine
8. Iodine
9. Oxygen\*

\* Elements of the RGF Advanced Oxidation Process. Friendly oxidizers do not use chemicals and revert back to oxygen and hydrogen.

## REME™ vs. Germicidal UV Lamps

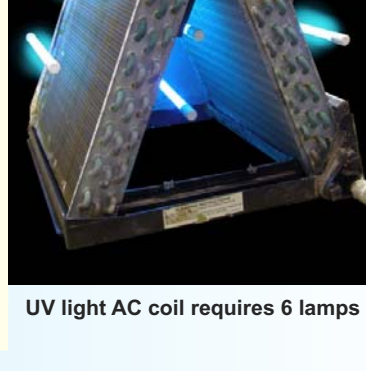
### UV-C - Germicidal Lamps

These are becoming very popular as an easy fix for the air conditioner coil mold problem. This is one of the most prevalent cause of the mildew smell you get when you enter an air-conditioned sick building. UV-C (254nm) lamps are basically similar to sun lamps and are typically only effective on microbials that pass by within a few inches of the lamp or areas where the light is shining directly on for extended periods of time, such as the air conditioner coil (see article in HVAC News - June 30 2003 and associated press 11-24-03). *Excerpt from article:*(The biggest questions from contractors are on placement, Pharo said. For instance, should UVGLs be installed in the return or supply?)

For air stream coverage, the study "Effectiveness of the Effectiveness of UV Lamps Installed in Circulating Air Ductwork," from the Air-Conditioning & Refrigeration Technology Institute (ARTI), recommends placement in the return side, with six lamps for optimum effectiveness, Pharo pointed out.

Due to space and financial constraints, however, "Most homeowners won't have that many lamps installed. So we recommend the concurrent installation of a really good filter, with the UV lamp placed over the indoor coil," Pharo said. "Air conditioning systems are great inventions, but the moist environment (at the coils) creates a microbial breeding ground."

Additionally, when UV lamps are shining directly on the coils, they are hitting a stationary target. When moving targets (VOCs and microbes) pass unharmed, the more sensitive microbes may be damaged, but the harder ones will pass unharmed. UV lights, for instance, have been found to be better applied to shine on the indoor coil, not to try to clean the air stream, particularly in residential and light commercial applications; air stream use requires intense UV saturation.)



UV light AC coil requires 6 lamps

**Pros:** Low cost, easy installation, and effective on suppressing mold growth on the coil that has the light shining on it.

**Cons:** Not effective at killing airborne microbials unless numerous lamps are used (see article). Only effective on the surface of the coil that is in direct light. This leaves much of the coil with no treatment. Does not provide ongoing room protection. Most UV systems install a glass UV mercury bulb without protection from breakage. A broken bulb could release mercury, a potential environmental and health hazard. Minimum of two lamps must be used to cover at least one-quarter of the coil surface (the upper half of the outer coil). For one-half coverage, three to six lamps must be used. 100% coverage is not practical. For a 90% kill rate of airborne microbials, 30" lamps would have to be placed every 2 ft in a 95 ft duct, calculated with a 24" x 24" plenum at 2000 cu ft per minute. A 95 foot lamp is not very practical and is reported in the HVAC News article "UV lamps are for coil surface mold". They are not effective in an HVAC system for virus or bacteria kills. Some UVc light companies state their UV systems can kill 99.99% of MRSA on a single pass and then reference an EPA study. This is very misleading as the test was conducted on a test unit of five UV high-energy lamps, each 50" long in a reflective tunnel, which burns 1,100 watts of electricity. This is the equivalent of running a hair dryer in you're A/C 24 hours a day. This obviously generates a lot of heat in addition to burning a lot of electricity, and the units cost thousands of dollars. This system is not something the homeowner would install. We make similar industrial UV systems. However, we specify those for industrial, very expensive heavy duty systems for food processing or medical applications. A standard 12" HVAC UV light system installed in an A/C coil will destroy mold growth on the coil that the UV light shines on. What sections of the coil the light does not hit will grow mold. To cover a coil with UV light would take four to six lights. The lights used on an A/C coil will provide little, if any, airborne microbial kill as the UV light would dwell time is not nearly enough to kill fast moving, airborne microbials. Air passing through an A/C coil is doing so at about 1,200 cfm or 30 inches per second; in layman's terms-"very fast."

## The REME™ Solution

The REME™ will destroy mold growth on an AC coil. The plasma, being a gas, will achieve full coverage as it moves in and around the AC coil fins controlling mold and bacteria growth.

