Meet BRAD - Big Room Air Disinfection

Helping Improve Indoor Air Quality In Large Spaces

AUVS
ADVANCED ULTRA-VIOLET SYSTEMS

Meet BRAD… Big Room Air Disinfection

The need for improved indoor air quality (IAQ) and, in fact, indoor air disinfection, has never been more critical. Airborne contaminants threaten staff, visitors and depending on your organization, customers, students, patients, attendees, and passengers.

A number of solutions, with varying degrees of effectiveness, attempt to deal with this problem in individual offices and small spaces. There has been no solution, however, to effectively address this need in larger spaces where people work and congregate, including cafeterias, gyms, libraries, auditoriums, arenas, transportation hubs, manufacturing plants and grow houses.

Now, Advanced Ultraviolet Systems (AUVS)—a leader in mobile device disinfection, whose solutions are relied on by more than 700 hospitals—has returned to its roots in air treatment with the introduction of BRAD - Big Room Air Disinfection.

BRAD can help protect people from ongoing and new health threats and meets the demands of a better-informed public for safer environments.

AUVS traces its origins to landmark air disinfection with its solution designed for, and implemented by, the US Pentagon more than a decade ago to combat bioterrorism. Today applications of its technology are used by more than 700 hospitals and hospital groups for mobile device disinfection.

BRAD – Single Pass, 2000 CFM Air Disinfection System

Meet BRAD BioProtector 3131

- BRAD is a commercial version of the air disinfection system we developed that is currently protecting the US Pentagon from bioterrorism.
- The system is available in an HVAC integrated model – **BRAD Basic** – and a free-hanging model – **BRAD SA** (Stand Alone) to meet your specific needs.
- BRAD uses a patented system that optimizes Ultraviolet (UV-C) energy in an advanced reflection chamber to kill airborne pathogens.
- The system can purify up to 120,000 cubic feet of air in one hour. That's a 12,000 square foot room with BRAD mounted at 10-feet.
- BRAD has been independently lab tested to kill Sars-CoV-2 and airborne MRSA at 99.97% and 99.999% respectively. It has been determined to kill other airborne threats including the common cold, Influenza (Flu), Chickenpox, Mumps, Measles, Whooping Cough, and Tuberculosis (TB).

Improve Indoor Air Quality and Reduce Costs

BRAD disinfects the air in large occupied spaces including cafeterias, gyms, libraries, auditoriums, arenas, transportation hubs, manufacturing plants, grow houses and operating rooms

You have a new ally in the battle against Covid-19, its Variants, the Flu, Mumps, the Common Cold, Chickenpox and even TB in big rooms where people congregate






Protect People in Large, Populated Areas with BRAD

3 Dr. Clark and the U.S. Pentagon

Air Disinfection: Back to Our Roots

After the Post 9/11 anthrax attacks, The US Department of Defense turned to Dr. Wayne Clark – their “go to” person for Germicidal UV.

Sponsored by the US Defense Advanced Research Projects Agency (DARPA), Dr. Clark and his team of PhDs developed their patented system, proven to kill airborne germs and spores in milliseconds as they pass through the system.

To this day, Dr. Clark’s solution is at work around the clock in the Pentagon protecting the US military. This same system is also used by Boeing, BAE Systems and in Pharmaceutical/Bio Manufacturing environments.

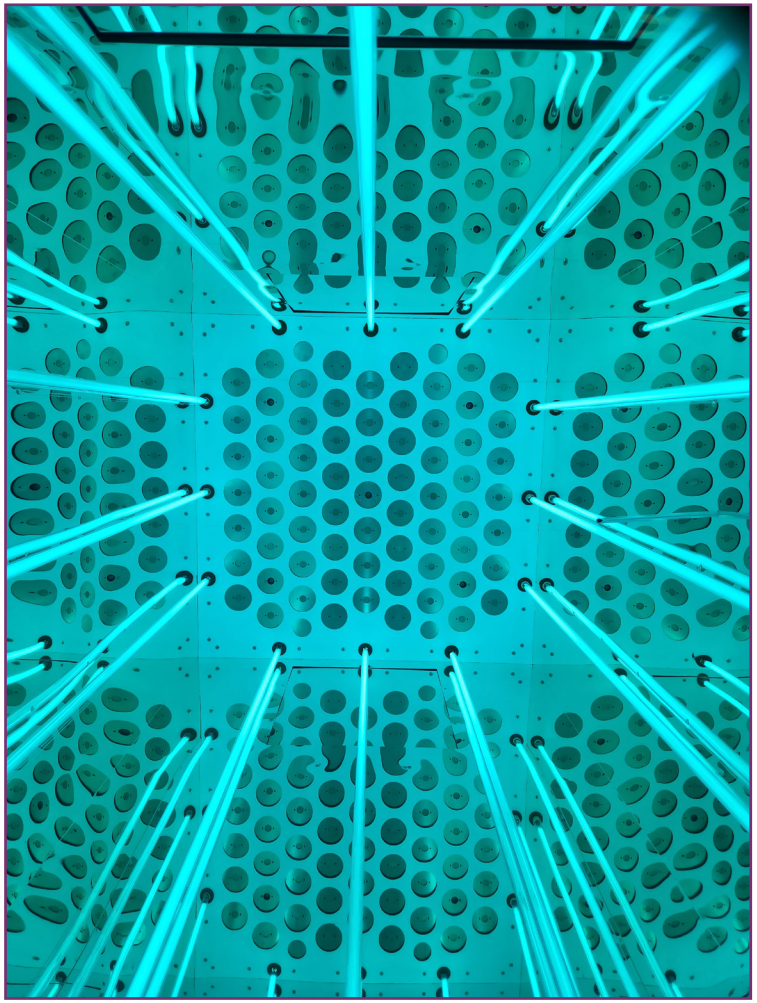
Adapting and scaling this proven technology for healthcare environments, schools and general businesses, Dr. Clark and AUVS are for the first time providing a solution that provides continuous, truly disinfected air.

Designed and built in AUVS’ Atlanta, Georgia plant, **BRAD Basic BioProtector 3131** and **BRAD SA BioProtector 3131** each use Dr. Clark’s patented application of UV-C in a fully enclosed, highly reflective germicidal chamber.

The large disinfection units installed at the Pentagon using specialty designed UV air treatment built into the HVAC system. The AUVS System is part of the department of defenses’ Immune Building Program to defend against bio-terrorism.

Proven Over More Than A Decade

BRAD Basic and BRAD-SA



BRAD is available in two models to meet the needs of your physical space. Both models use UVC technology that is reimbursed by FEMA and accepted by the CDC guidelines as effective for disinfecting moving air.

BRAD Basic can be integrated into your existing HVAC system(s), usually as part of new construction, renovations and major remodeling projects. As an above-theceiling solution, it is used for large open areas or hospital operating rooms with high levels of air exchanges.

BRAD–SA (Stand Alone) is a permanently mounted air disinfection system that is separate from your HVAC system. It both filters particles and kills airborne pathogens. Installed in just a few hours, BRAD-SA is perfect for large areas such as gyms, cafeterias, casinos, lobbies and operating rooms in older buildings where a significant investment of time or capital for a major HVAC remodeling is not practical.

Both Models Are…

- Safe. There is no ozone or light leakage, as tested to UL standards by TUV.
- Rugged: built to military standards.
- Simple to use, and modular with easy to exchange UV-lamps.
- Proactive. It will notify you when UVC lamps have met their life expectancy.
- Far less expensive and more effective than other solutions for improved air quality in large areas or rooms that need rapid air exchanges such as operating rooms.

The Science

Can UVC Energy Kill Airborne Pathogens?

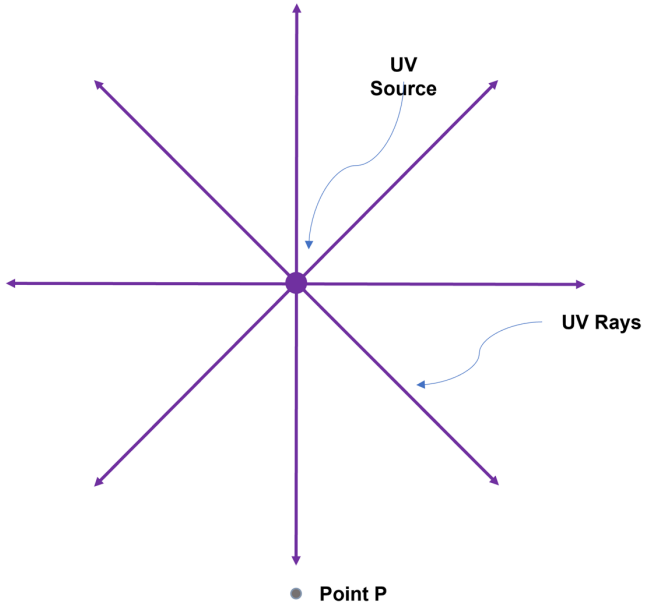
UVC is the accepted method of air disinfection according to FEMA and the CDC. It is also the technology approved for US government reimbursement. The question is: How effective is it?

Traditional Approach:
Placing UV lamps in an existing HVAC air duct

Most Ultraviolet solutions involve placing UV lamps in existing HVAC air ducts. This approach has proven to be problematic.

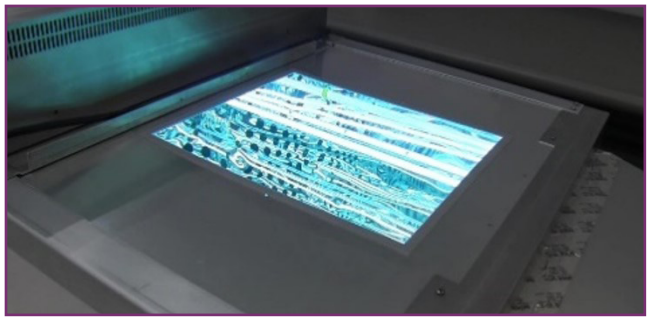
Problem 1:
Airborne pathogens move too quickly and there is not enough energy or time applied to kill them.

Problem 2:
The UV source radiates UV energy in all directions. Some of the energy is directed toward the area of interest, denoted here as Point P, but much of the energy is dispersed in other directions.



UV Energy Without Reflection
Most energy is dispersed away from the target

AUVS' Pentagon System dramatically increases irradiance throughout our specially designed reflective chamber

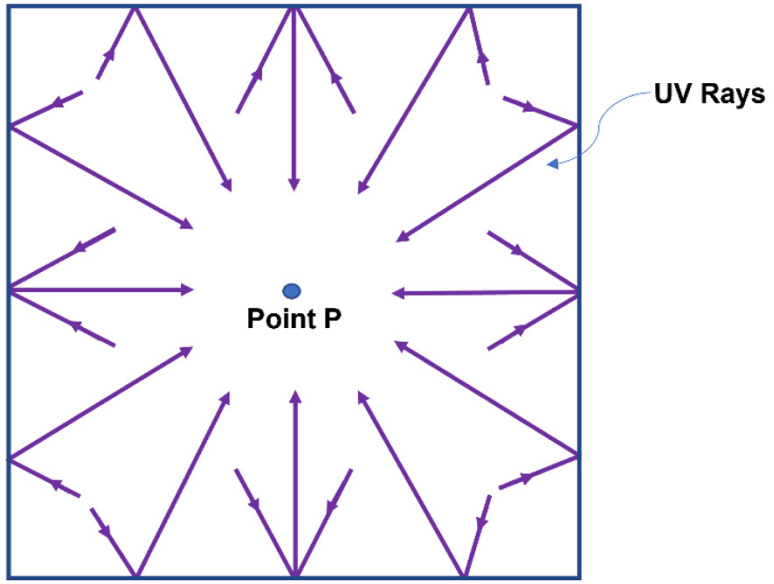


Problem Solved: The Pentagon System - Installing a Specially Designed UV Air Treatment Unit

AUVS employs a specially chamber constructed with highly reflective materials that retains the UV energy and increase the irradiance with high efficiency.

The result is that rather than losing the UV energy not initially directed toward the point of interest, multiple reflections redirect dramatically high levels of energy to target, Point P.

The flow of energy is continuous which proves to be a match for the fast-moving pathogens.



UV Energy With Reflection
Irradiance toward the target is efficiently and radically increased

Increased UV-C Irradiance and Efficiency

Independent 3rd Party Testing

Single Pass 2000 CFM Results

Military grade testing used aerosolized airborne contaminants with a one-second exposure. At 2000 CFM, the single-pass test results show the BRAD BioProtector 3131 provided disinfection rates of 99.97% and 99.999% for Sars-CoV-2 and Staphylococcus Aureus (MRSA) respectively.

Staphylococcus Aureus (MRSA) – 5.1 Log - 99.999% Disinfection

Unit Off		
	Upstream	Downstream
Concentration CFU/Ft3	2.33×10^4	1.14×10^4
LOG (Concentration)	6.37	6.05

Unit On		
	Upstream	Downstream
Concentration CFU/Ft3	2.49×10^4	19.81
LOG (Concentration)	640	130

Sars-CoV-2 - 3.7 Log - 99.97% Disinfection

Unit Off		
	Upstream	Downstream
Concentration CFU/Ft3	4.7×10^4	3.12×10^4
LOG (Concentration)	6.67	6.49

Unit On		
	Upstream	Downstream
Concentration CFU/Ft3	2.331×10^4	6.5×10^4
LOG (Concentration)	6.36	2.92

* Using MS-2 Bacteriophage, the EPA-approved surrogate for SARS-CoV-2

Up to 99.999%, 5.1 Log Disinfection

Your New Ally in the Battle against Sars-CoVid-2, MRSA the Common Cold, Influenza (Flu), Chickenpox, Mumps, Measles, Whooping Cough, and Tuberculosis (TB).

BRAD's calculated results based on the amount of energy in the disinfection chamber and the amount of energy needed to kill the identified pathogens confirm its capability to fight the common cold, flu, mumps, chicken pox and TB.

CALCULATED SINGLE PASS KILL IN FLOWING AIR- BP3131 - 2000 CFM (DOSE = 14.7 mJ/cm²)				
Microorganism	**Type**	**Measured D-Value[1] (mJ/cm²)**	**Reference**	**Calculated Kill (logs)**
Bacillus anthrasis	Bacteria	4.51	Sharp (1938)	3.3
Bacillus subtilis	Bacteria	7.1	Rentschler,et al (1941)	2.1
Escherichia coli	Bacteria	0.612	Sharp 1940	24.0
Legionella pneumophilia	Bacteria	1.12	Gilpin 1984	13.1
Salmonella typhi	Bacteria	2.1	Sharp 1938	7.0
Pseudomonas aeruginosa	Bacteria	0.4	Sharp 1940	36.8
Serratia marcescens	Bacteria	2.4	Rentschler et al 1941	6.1
Shigella paradysenteriae	Bacteria	1.7	Sharp 1938	8.6
Staphylococcus albus	Bacteria	1.8	Sharp 1938	8.2
Staphylococcus aureus	Bacteria	0.662	Sharp 1939	22.2
Staphylococcus hemolyticus	Bacteria	2.15	Sharp 1938	6.8
Streptococcus lactis	Bacteria	6.22	Rentschler et al 1941	2.4
Mycobacterium tuberculosis	Bacteria	0.487	Riley 1976	30.2
Adenovirus	Virus	4.2	Jensen 1964	3.5
Vaccinia	Virus	1.5	Jensen 1964	9.8
Coxsackievirus	Virus	2.1	Jensen 1964	7.0
Influenza A	Virus	1.9	Jensen 1964	7.7
SARS-CoV-2[2]	Virus	4.17	Inagaki 2020	3.5
SARS-CoV-2[3]	Virus	1.23	Bianco 2020	12.0
Notes:				
1. D-Value = Measured Dose required for 1-log reduction (in Air unless noted)				
2. Tests in vitro				
3. Tests on surface				

Wherever people congregate for work or recreation, they are at increased risk from airborne contaminants which can result in illness, absenteeism, increased insurance and staff replacement costs, and reduced productivity

Help Fight Infections from Common Cold to Covid 19

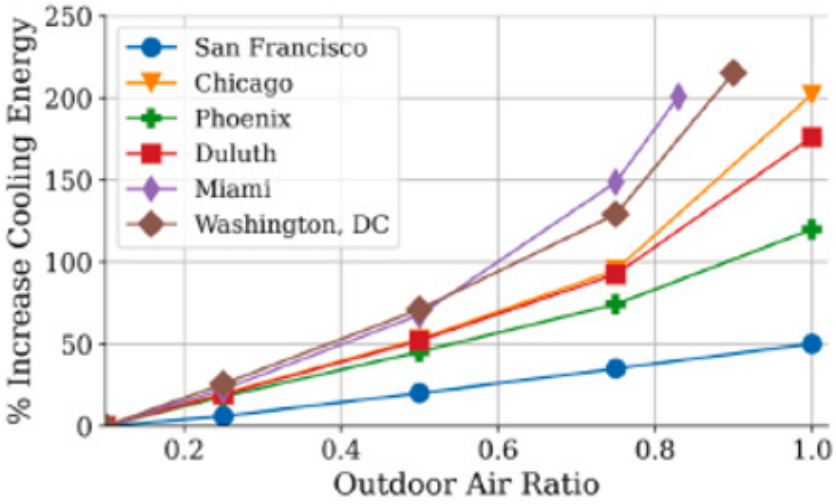
Energy Savings and Government Incentives

BRAD Addresses the Energy Costs Related to Infection Mitigation

One approach to mitigating the spread of infection caused by airborne contaminants, endorsed by organizations including ASHRE and the CDC, is increasing the outdoor air introduced into the building, particularly as a method of dealing with COVID-19.

Modern building HVAC models climatize the air that is tightly contained in the building and a controlled amount of outdoor air. Increasing outdoor air introduced manually—opening windows—or mechanically—through the air handler dampers—is proven in studies to increase energy costs by up to 215%.

BRAD, by providing air disinfected of harmful contaminants at rates of up to 99.999% in a single pass at 2000 CFM limits the amount of outdoor air needed to be introduced and climatized. This allows management to control energy costs while still better protecting staff, customers, patients, students and families.



Energy costs increases foe selected cities based on the introduction of outside air to mitigate indoor contagion.

Government Support

A variety of ongoing and evolving funding options from the Federal Government through the American Rescue Plan and departments including the EPA exist to support organization in improving Indoor Air Quality and mitigating airborne disease transmission.
For current programs visit www.advanceduvsystems.com/bioprotector3131.

Reduced Energy Costs, Government Support…

From Reducing HVAC and climate-related costs to earning LEED Credits and taking advantage 10 of other government incentives, BRAD's presence can show up on your bottom line

BRAD and LEED Credits

Leadership in Energy and Environmental Design (LEED) Certification was developed as a third-party green building certification system by the U.S. Green Building Council, LEED certification status has proved beneficial for developers and building owners alike. LEED credits are given based on the overall site/building eco system. Products used to affect the overall site status will help with points in certain categories.

In order for a building to be considered LEED-certified it must be efficient in its use of materials during construction and maintenance into the future. In order to earn points, you have to meet credit qualifications, which include things like using less water and energy, as well as limiting greenhouse gas emissions, not to mention the building materials used. As with many things, some areas and items are negotiable, and you have to educate officials on new technologies that address specific categories.

BRAD may help in the following categories:

1. **Indoor Environmental Quality** - The Indoor Environmental Quality category rewards decisions made by project teams about indoor air quality and thermal, visual, and acoustic comfort. Green buildings with good indoor environmental quality protect the health and comfort of building occupants.
   - *BRAD directly targets indoor air quality (IAQ) above and beyond standard energy efficient HVAC systems and filtration.*
2. **Innovation** - Sustainable design strategies and measures are constantly evolving and improving. New technologies are continually introduced to the marketplace, and up-todate scientific research influences building design strategies. The purpose of this LEED category is to recognize projects for innovative building features and sustainable building practices and strategies.
   - *BRAD addresses the use of new technologies to improve health, well-being and IAQ. There is also a precedence already out there for point awards based on UVC in the HVAC system.*
3. **Energy & Atmosphere** - This category approaches energy from a holistic perspective, addressing energy use reduction, energy-efficient design strategies, and renewable energy sources.
   - *BRAD can be attributed to energy efficient design strategies in lieu of HEPA filtration that causes a pressure drop and extra HVAC load/energy use also in lieu of makeup air (air from the outside) that must be conditioned.*

NEW: LEED credits for coronavirus prevention belong to a new category called Safety First. These are still pilot credits that will be updated based on new information about COVID-19, as well as feedback from the building sector.

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ADVANCED ULTRA-VIOLET SYSTEMS

www.advanceduvsystems.com

For an online/virtual demo or in-person meeting on BRAD or any product in the AUVS line, contact us:

- **sales@advanceduvsystems.com**
- **803-504-0325**

Warranty:
2 Years Parts and Labor (except lamps)

Made in the USA
EPA Est No. 99021-GA-1

BRAD BioProtector 3131 Specifications	
Overall Dimensions	36" H x 68"D x 41" W
Input Voltage and Wattage	120 VAC 1693.8 Watts
Weight	130 lbs.
Power	120V /240 VAC, 50/60 Hz, 2400 Watts
Light Source	Mercury Germicidal UV Lamps (12)
Wavelength	>85% Output at 253.7 nm
Average Lamp Life	10,000 hours
Airflow Volume	2000 CFM

Complete your Infection Prevention Program with (l to r) AUVS' **Rollie Mini-Bot** room disinfection; **The UV Box** device disinfection; **Ray EMS** vehicle interior disinfection; and **The UV Cube** larger device and high-volume disinfection.