

Innovation **Applied**

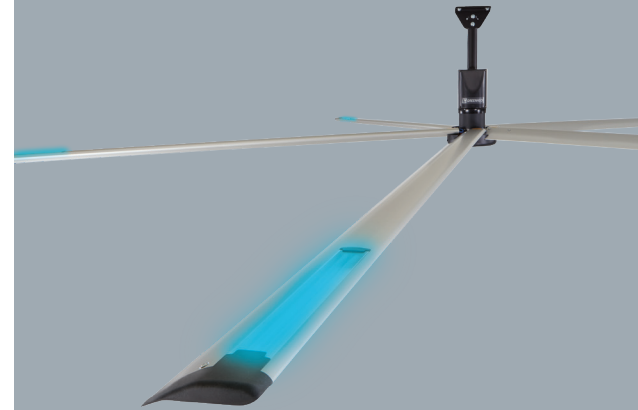
UV-C HAS BEEN USED FOR DECADES AND THE ADDITION OF AIR MOVEMENT HAS BEEN SHOWN TO INCREASE UV-C'S EFFECTIVENESS. LEARN MORE ABOUT THIS UNIQUE APPLICATION THAT HAS SHOWN INCREASED PROTECTION OF PEOPLE FROM AIRBORNE PATHOGENS IN BUILDING ENVIRONMENTS.

What is Northern Light® technology?

Northern Light is a patented technology that combines Greenheck overhead HVLS fans with UV-C light to inactivate airborne viruses and bacteria.

Why would I want UV-C lights on an overhead fan?

Upper room UV lighting systems (also known as UVGI — ultraviolet germicidal irradiation systems) have been used for decades to fight infection in medical facilities and are recommended by the CDC, ASHRAE, and other organizations as an effective solution to reduce the risk of airborne virus transmission, including the virus that causes COVID-19. These systems use the natural rise and fall of convection or mechanical air currents to circulate airborne infectious agents into the upper room, where they are exposed to UV-C radiation and inactivated. Studies have shown that ceiling fans can increase the effectiveness of upper-room UVGI devices by more than 60% when used together due to the improvement in air mixing and distribution provided by the fans. Greenheck DC-5 with Northern Light's unique, patent-pending design combines the air cleaning benefit of upper-room UVGI with the air circulation capabilities of overhead fans to create the industry's most efficient solution for disinfecting and distributing clean air.



HVLS FANS UV-C LIGHT

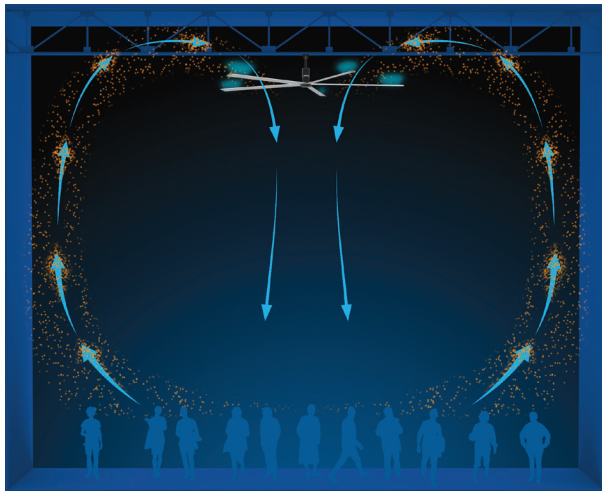
Studies show that ceiling fans
increase the effectiveness of
upper-room UVGI devices
by more than

60%

when used together
due to the improvement
in air mixing and distribution
provided by the fans.

How does Northern Light technology work?

Non-ozone generating UV-C bulbs are installed inside the fan blades and positioned toward the tips of the blades where the majority of air movement occurs for the most effective inactivation of pathogens (in competitor products, the UV-C lights are positioned in dead air zones near the center of the fan reducing effectiveness). As the fan operates, contaminated air from the lower portion of the room is circulated to the ceiling where it is exposed to powerful UV-C light as it moves across the fan's blades. This UV-C light damages the genetic material (DNA and RNA) of pathogens in the airstream, removing



their ability to replicate and rendering them noninfectious (inactive). The resulting clean air is then circulated back into the lower portion of the room where occupants are present, thereby lowering their risk of infection.

Can Northern Light technology inactivate the virus that causes COVID-19?

Yes. According to the Centers for Disease Control and Prevention (CDC), recent research indicates that the UV-C lights used on DC-5 fans with Northern Light are capable of inactivating SARS-CoV-2 (the virus responsible for COVID-19).

This research is ongoing and there is limited published data about the exact UV-C dose and duration required to inactivate the virus. However, early results indicate that SARS-CoV-2 is very similar to other coronaviruses (for example, SARS and MERS) regarding the UV dose necessary to inactivate it.

How does Greenheck DC-5 with Northern Light compare to other UV products? Why is it better than a typical UVGI system?

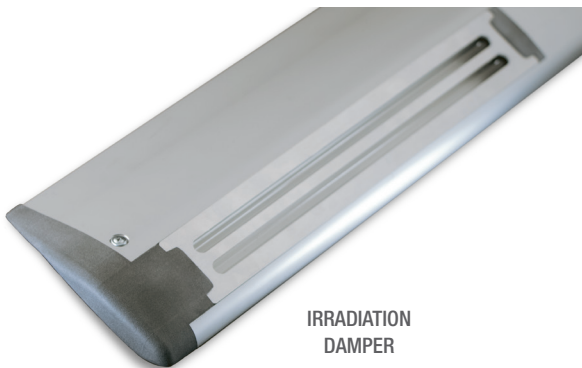
Greenheck DC-5 overhead fans with Northern Light are the industry's most efficient and climate-friendly solution for disinfecting and distributing clean air, as less energy is required for effective disinfection when compared to alternative HVAC solutions like increasing outdoor air changes or traditional UVGI systems.

ASHRAE and other organizations have recommended the use of increased ventilation rates (air changes per hour, ACH) to reduce the likelihood of transmission of COVID-19. However, studies have shown that increasing ventilation rates by as little as one air change per hour can lead to thousands of dollars in additional operating costs as fresh, outdoor air must be conditioned before it is introduced into the building. As an alternative, upper-room UV systems have also been recommended by a variety of organizations (including the CDC) due to their ability to perform germicidal "equivalent" air changes per hour. Studies have shown that one hour of use of an upper-room/air UV-C fixture can be equivalent to 10 to 16 air changes depending on UV light intensity. However, traditional UVGI systems can be costly to install and operate due to their relatively small treatment areas (100-300 square feet per unit) resulting in the need for multiple units.

In comparison, one large diameter DC-5 fan's air mixing and distribution capabilities combined with Northern Light UV-C technology can disinfect a much larger treatment area — up to several thousand square feet. Coupled with operating costs as low as \$1 per day, it's easy to see why DC-5 with Northern Light is the superior solution for air disinfection.

Are DC-5 fans with Northern Light technology safe?

Yes, when properly installed and operated DC-5 fans with Northern Light are safe for humans. Greenheck DC-5 with Northern Light's uplight design directs UV-C light away from occupants, minimizing UV radiation exposure so that fans can be safely utilized in occupied spaces. Fans are also installed a minimum of 10 feet above the floor to further prevent direct line of sight to UV-C lights. In addition, the system features interchangeable UV-C irradiation dampers that physically reduce the size of the opening in the fan blade for UV-C light to shine through. This effectively reduces the UV-C radiation intensity by as much as 95%, allowing end users to customize UV output for effective yet safe pathogen inactivation in their space.



IRRADIATION
DAMPER

Does Northern Light technology produce ozone?

No, Northern Light technology uses non-ozone generating UV-C light bulbs.

How do I determine how many DC-5 fans with Northern Light I will need?

Selection tools are available in CAPS® and eCAPS® that utilize engineering data to help users identify an appropriate fan size and quantity of fans for their space. These tools remove guesswork from the selection process and ensure you are getting the right amount of air cleaning for your space.

Are the fans hard to install?

No. DC-5 fans with Northern Light offer the same features that make all Greenheck overhead fans easy to install: lightweight fan design, highly efficient direct drive motor and VFD, universal mount, and low overhead clearance requirements. In addition, plug-and-play wiring installation for the UV-C lighting components, fan power, fan communications, and fire system integration further ensures fast and easy installation and peace of mind that the unit operates as intended.



PLUG-AND-PLAY WIRING

1 HOUR

of use of an upper-room/air UV-C
fixture can be equivalent to

10-16 AIR
CHANGES

depending on UV light intensity.

What safety precautions should be taken when installing or using the Northern Light system?

Installers should conduct all work wearing appropriate personal protective equipment such as eye and face protection to minimize exposure to UV-C light. Make sure the system is always powered off and secured when working near or above the fan blades to prevent direct exposure. It is also the responsibility of the installer to measure the UV-C radiation at ground level and install the appropriate UV-C irradiation dampers to reduce UV-C output if necessary.

End users should never look directly into the UV-C lights during operation.

How often do I need to maintain the fans?

Inspection and cleaning of the installed systems is recommended every six months at a minimum to maintain disinfection effectiveness. UV-C bulbs and ballasts must also be replaced periodically as needed, typically every 1-3 years depending upon daily hours of operation for the fans.

UV-C bulbs and ballasts can be locally sourced through electrical or lighting suppliers for easy replacement and maintenance.



WEAR EYE AND FACE PERSONAL
PROTECTIVE EQUIPMENT

