healthē®

BY LIGHTING SCIENCE

cleanse®

AIR + SURFACE SANITIZATION

Harnessing the Power of Light
to Promote Health and Wellness

healthe®

BY LIGHTING SCIENCE

Healthe is a health and wellness company that pioneers the use of light as a platform to **sanitize air and surfaces**, and to help **regulate your body's circadian clock** to boost performance and enhance sleep.

Healthe was created from Lighting Science, one of North America's largest developers and manufacturers of LED bulbs and systems, which produces approximately 60 million bulbs and fixtures annually and is behind the EcoSmart (Home Depot) and Amazon Basic brands of LED bulbs.

AWARD-WINNING PRODUCTS

We have won numerous Business Intelligence Group (BIG) Awards, Edison Awards, Sapphire Awards, the IES Illumination Award, and IES Progress Report Recognition along with Popular Science Magazine's Best of What's New award, Architect's Newspaper Best Products, Architectural Record Product of the Year and one of Travel + Leisure Must-Have Products of the Year.

PROVEN TECHNOLOGY

Founded in 2000 and holding over 400 patents, Lighting Science Group (LSG) is one of the largest private-label LED businesses in the U.S. We have partnered with NASA, Harvard University, DARPA and others to discover new uses for LEDs ranging from air sanitization to vision enhancement. Healthe was spun off from LSG in 2019.

healthē®

BY LIGHTING SCIENCE

FRED MAXIK

Founder, Lighting Science
Chief Scientific Officer, Healthe

Fred Maxik is one of the world's foremost experts in Solid State Lighting. He has over 25 years of experience designing technologies that intersect light, biology and sustainability. He is the principal inventor on more than 200 patents in the United States, and many more worldwide, and he has published several papers on light and its interaction with biological systems. Mr. Maxik is the recipient of a White House Champion for Change Award, a Congressional Medal of Merit, and the NASA Group Achievement Award, among others.

cleanse®

Cleanse is a portfolio of antimicrobial products that help improve air quality in any high traffic or public infrastructure locations, such as hospitality, retail, schools, prisons and transportation hubs.

Indoor air quality is critical in the quest to keep people healthy and well, especially in today's global, interconnected environment.

INFECTION TRANSMISSION

Pathogens are organisms, such as viruses, bacteria, fungi or parasites, that can cause infection and life threatening disease.

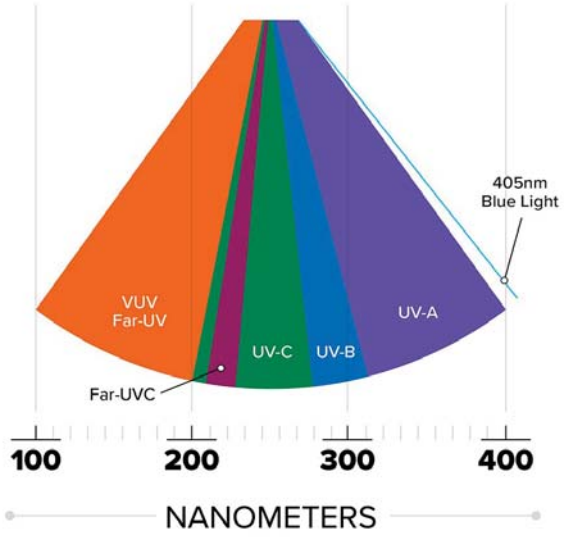
The transmission of infection occurs in AIR, in WATER and on SURFACES.

THE CHALLENGE

UV EXPOSURE

There are multiple bands within the ultraviolet (UV) spectrum that yield different germicidal effectiveness and human safety requirements.

- Ultraviolet C (UV-C) exposure kills viruses, bacteria and mold by chemically modifying or destroying their genetic material (DNA and RNA), rendering them inactive and preventing replication.
- Ultraviolet A (UV-A) serves as an agent to the photocatalyst TiO2 (used in coatings and cleansers) to break down organic molecules and microbes.



THE SCIENCE

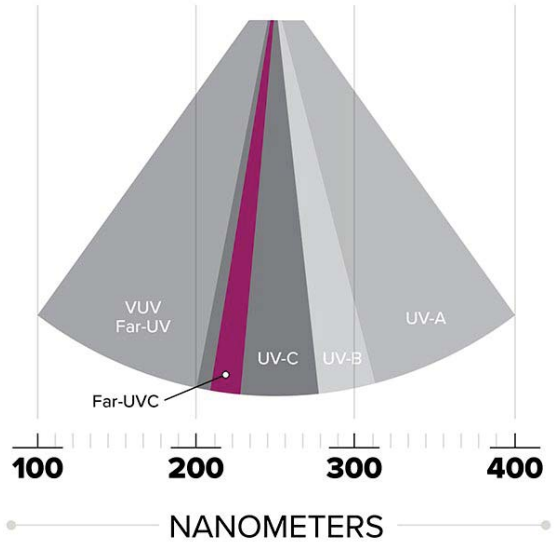
UV-C EFFECTIVENESS

The effectiveness of UV-C (200-280nm) on inactivating or destroying microbes depends on the microorganism's structure, size and resilience, in addition to the UV exposure:

- Wavelength (UV-C or Far UV-C)
- Intensity
- Duration

Far UV-C (207-222nm), a subset of UV-C, is the most efficient at lower doses and has a higher absorption rate to penetrate and inactivate bacteria and viruses.

See References in APPENDIX



THE SCIENCE

UV SAFETY

Broad-spectrum UV (UV-A, UV-B and UV-C) must be shielded from humans as it poses a carcinogenic safety risk, with an exception:

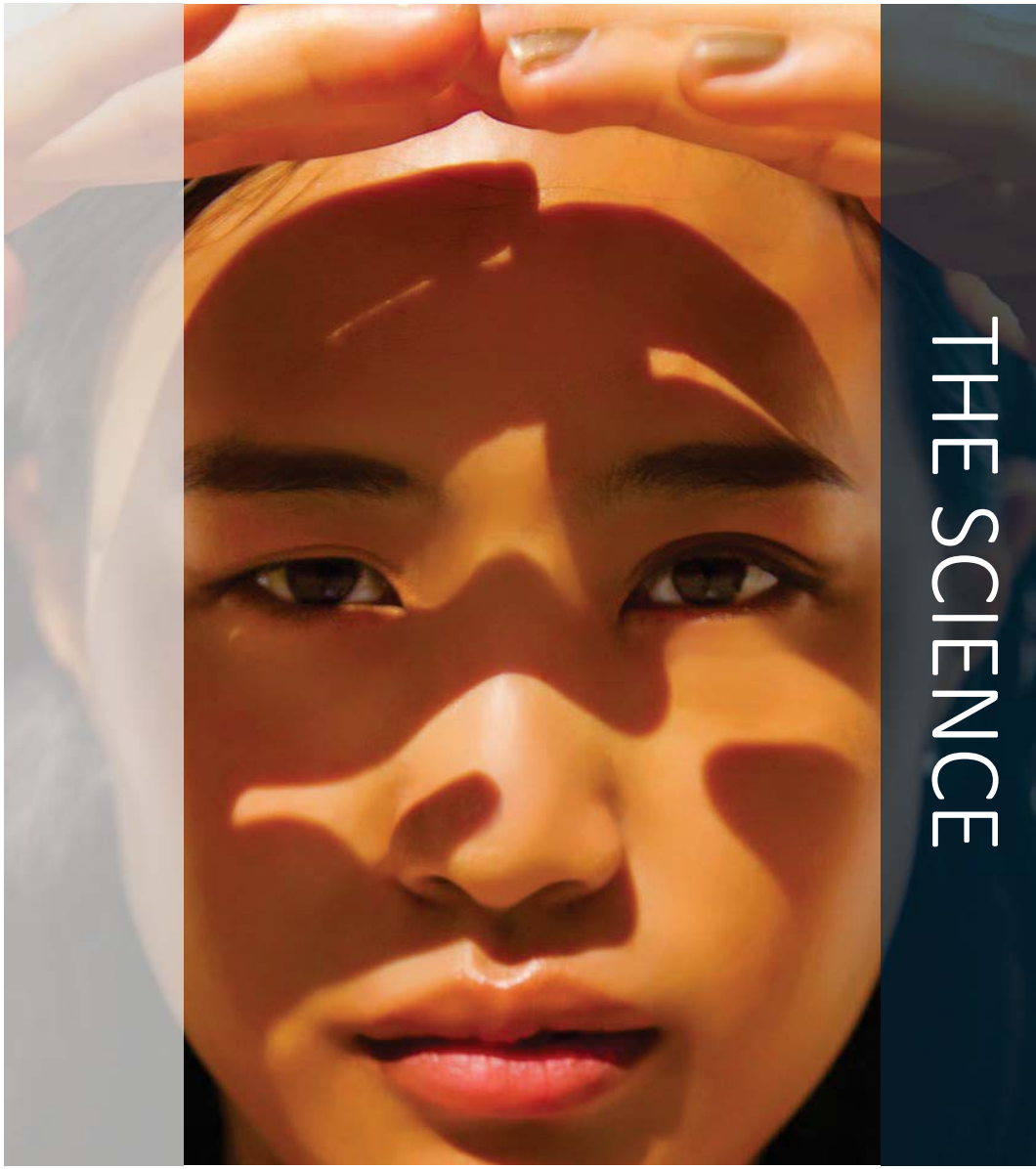
Continuous low doses of Far UV-C (222nm) have been studied and no human effects reported.

See References in APPENDIX

"Far-UVC light has a very limited range and cannot penetrate through the outer dead-cell layer of human skin or the tear layer in the eye, so it's not a human health hazard. But because viruses and bacteria are much smaller than human cells, far-UVC light can reach their DNA and kill them. "

David J. Brenner, PhD

The Higgins Professor of Radiation Biophysics at the Vagelos College of Physicians and Surgeons and Director of the Center for Radiological Research at Columbia



cleanse®

AIR SANITIZING TROFFER

MADE IN CANADA
STOCK IN USA

THE SOLUTION

AIR SANITIZATION

- Multi-stage process achieves 99.9% removal rate of common airborne microbes using Activated Carbon and HEPA filtration and UV (C+A) LEDs
- Defends against MOLD, BACTERIA & VIRUSES
  See lab validation in APPENDIX
- One Cleanse per 800ft3 (10x10x8) achieves 4 Air Exchanges per hour (50cfm)

LIGHTING

- 3200 lumens, True Circadian™ LED Source
  4000K (90+CRI) or 5000K (85+CRI) GoodDay® or 2700K (80+CRI) GoodNight®
- Dimming and fan speed control with wireless switch and/or App

INSTALLATION

- Retrofits into standard 2x4 troffer housing, new housing and surface mount kits available

cleanse®

AIR SANITIZING TROFFER

MULTI-STAGE AIR SANITIZATION PROCESS

- **HEPA-Carbon Activated Filter**

  HEPA (High Efficiency Particulate Air) filter traps pollutants > 0.3µ such as pollen, spores, pet dander and dust mites

  Activated Carbon removes gases, chemicals and volatile organic compounds (VOCs) and odors

  Filter replacement recommended every 6 months

- **UV (Ultra-violet) A+C Light**

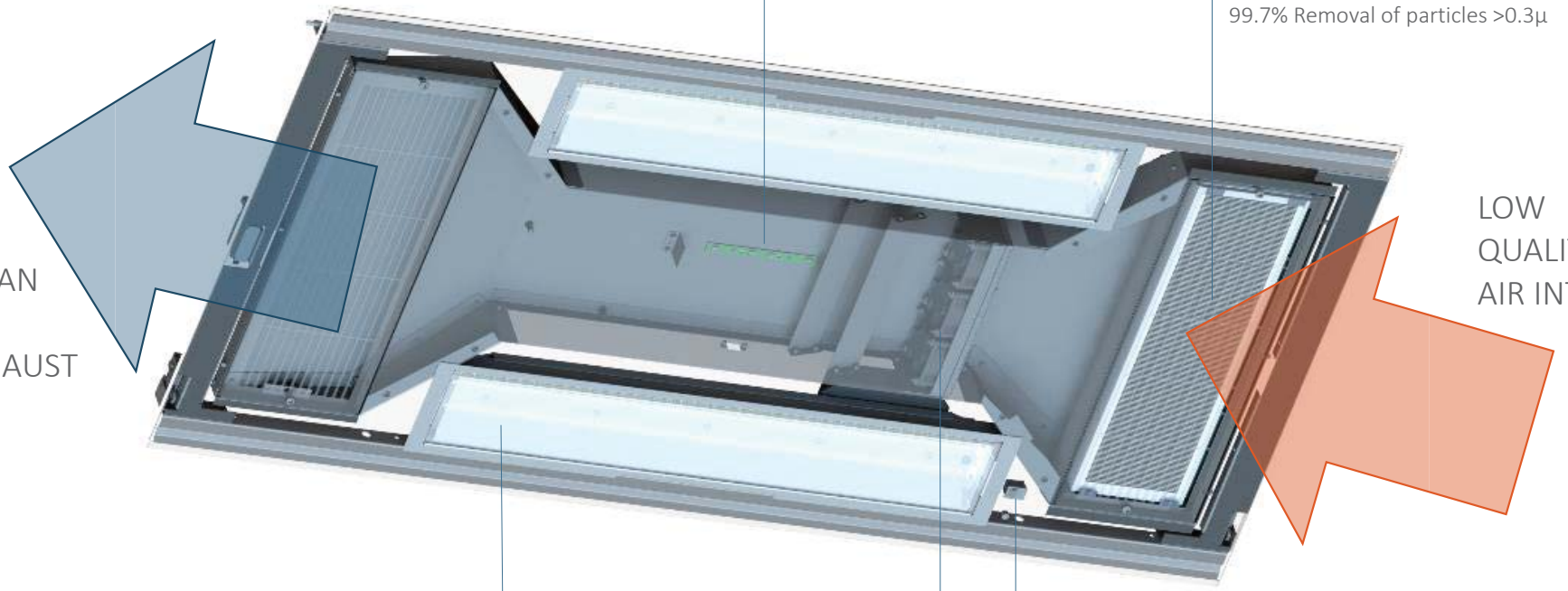
  Non-visible electro-magnetic radiation inactivates and destroys microbes

  UV LED array replacement recommended every 6 months (~12hr/day operation)

THE SOLUTION

cleanse®

AIR SANITIZING TROFFER



THE SOLUTION

MADE IN THE USA

cleanse®

AIR + SURFACE SANITIZING DOWNLIGHT

INACTIVATES AIR + SURFACE MICROBES

- Far-UVC technology effectively penetrates and inactivates microbes without harm to humans allowing passive, continuous sanitization
- Inactivation will depend on microbe type, distance from the source and duration of exposure

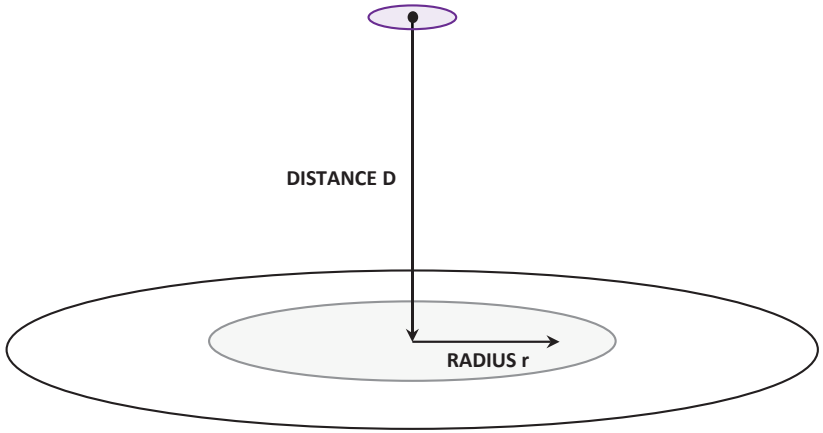
SPECIFICATIONS

- 6in form factor designed as retrofit for conventional recessed cans
- General illumination white light (600lm) with a boost at 435nm helps to activate the antimicrobial properties of TiO_2 surface coatings and cleaners
- Multiple modes of operation with integral PIR motion sensor to independently control general illumination and/or Far-UVC source
- Multiple input voltage available (120V or 220V) with power consumption of 20W
- Far-UVC Lamp lifetime of >3,000 hours

THE SOLUTION

cleanse®

AIR + SURFACE SANITIZING DOWNLIGHT



SINGLE DOWNLIGHT

Time (minutes) required to inactivate 99% of human coronavirus (1.0mJ/cm2)

Horizontal RADIUS r (in)		0	10	20	40	60	80	100
Vertical DISTANCE D (in)	6	0.32	6					
	12	1	4	24				
	15	2	4	21				
	20	3	6	17				
	24	5	7	16	98			
	36	11	13	20	66	212		
	48	19	21	27	56	172	382	
	60	31	33	39	83	153	335	615
	66	36	39	45	75	142	298	532
	72	44	47	53	81	146	275	525
	78	51	55	60	87	148	269	506
	90	67	71	77	100	157	264	421

Green < 30 min
Yellow 30-60 min
Red > 60min

The time required is based on a modeled distribution of the Far-UVC source and the fluence required to inactivate human coronavirus from the following Columbia University study: *Far-UVC light efficiently and safely inactivates airborne human coronaviruses*; Nature Research; 2020; DOI: 10.21203/rs.3.rs-25728/v1

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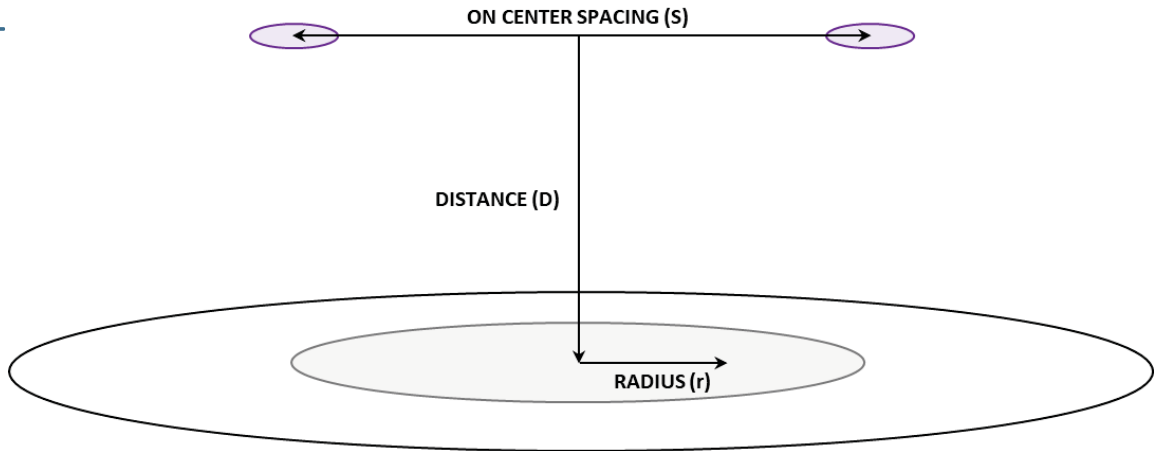
AIR + SURFACE SANITIZING DOWNLIGHT



ROW OF DOWNLIGHTS

Time (minutes) required to inactivate 99% of human coronavirus (1.0mJ/cm2)

Horizontal RADIUS r (in)		0	20	40	60	80
Vertical DISTANCE D (in)	24	39	11	5	22	153
	36	27	17	12	25	85
	60	33	26	26	39	79

Green < 30 min
Yellow 30-60 min
Red > 60min

The time required is based on a modeled distribution of the Far-UVC source and the fluence required to inactivate human coronavirus from the following Columbia University study: *Far-UVC light efficiently and safely inactivates airborne human coronaviruses*; Nature Research; 2020; DOI: 10.21203/rs.3.rs-25728/v1

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EQUIPMENT SANITIZATION CABINET (CONCEPT)

DESTROYS MICROBES

- 250-280 UVC light sources, including LEDs and low pressure mercury vapor in quartz tubes eliminates 99.999% of microbes
- Shared equipment and tools are sterilized in a 5 minute cleaning cycle

FORM FACTOR

- 13.5ft^3 Stainless Steel Cabinet with UV resistant finish
- (3) Interior racks accommodate various sizes of equipment and controlled vibration reduces shadowing to maximize exposure surface area

SPECIFICATIONS

- Auto safety shut-off when door is opened for UV exposure protection
- Indicating light/timer illuminates when sanitization in process
- Plugs into 110-120V wall outlet
- UV LED lifetime of >2,000 hours

THE SOLUTION

cleanse®

PORTABLE UV SANITIZING TOTE

DESTROYS MICROBES

- 260-280nm UVC technology effectively eliminate 99.9% of microbes
- Personal items such as phones, wallets, glasses and keys are sanitized in a 3 minute radiation cycle

FORM FACTOR

- Portable 9.5”W x 5.5”H x 7.7”D tote

SPECIFICATIONS

- Auto shut-off when lid is opened provides protection from unwanted UV exposure
- 24VDC power adaptor included, power consumption of 15W
- UV LED lifetime of >10,000 hours

THE SOLUTION

cleanse®

PERSONAL UV SANITIZING BOX (COMING SOON)

DESTROYS MICROBES

- 260-280nm UVC technology effectively eliminates 99.9% of microbes
- Personal items such as phones, wallets, glasses, keys or beauty and cosmetic tools are sanitized in a 3 minute radiation cycle

FORM FACTOR

- Compact 8.5”W x 4.2”H x 3.1”D case can also clean makeup brush sets with provided tool holder

SPECIFICATIONS

- Auto shut-off when lid is opened provides protection from unwanted UV exposure
- 10VDC USB-C adapter included, power consumption of 7W
- UV LED lifetime of >10,000 hours

THE SOLUTION

MAGNOLIA BAKERY
NEW YORK CITY

THE CHALLENGE

During the coronavirus pandemic, Magnolia Bakery instituted aggressive cleaning practices in all locations that remained open for takeout and delivery. As efforts to reopen all services began, they wanted to continue to safeguard the safety of staff and customers. The Healthe Cleanse products provided continuous sanitization, beyond one-time disinfection programs, ensuring round-the-clock protection.

THE SOLUTION

- Cleanse Downlights and Air-Sanitizing Troffers at the e-commerce production facility
- Cleanse Downlights and Air-Sanitizing Troffers at the Bleeker St. and Columbus Ave. retail locations

THE RESULTS

“People want to know that they can come in the door and have their child with them and not worry about who’s in front of me and who’s waiting on me,” said Bobbie Lloyd, Chief Baking Officer.

MIDLAND GLASS AND GARAGE DOORS

THE CHALLENGE

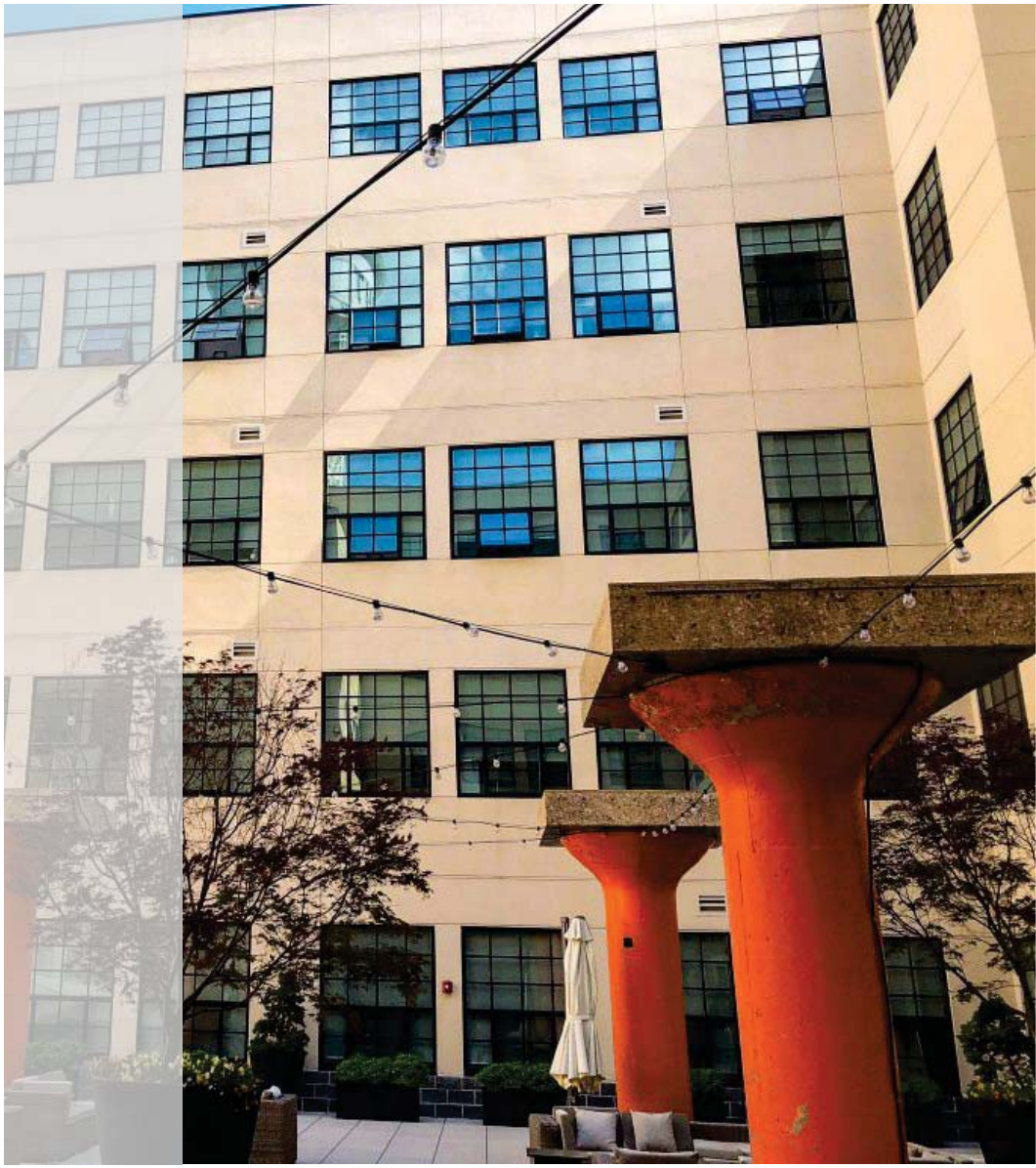
For a company that specializes in daylighting the built environment, the corporate office and warehouse of Midland Glass and Garage Doors were lacking in natural light and it's inherent benefits on attentiveness and productivity. When essential employees were asked to report to the office during the coronavirus pandemic, continuous sanitization also became a priority.

THE SOLUTION

- SunTrac® Troffers and Downlights in the office and warehouse
- Cleanse® Air-Sanitizing Troffer in the office

THE RESULTS

The owner has noted a positive attitude shift of his warehouse staff, as well as 30-minute site departure improvement that he attributes to the Healthe circadian lighting. The Cleanse Troffer has also given employees a much greater degree of comfort when reporting to work.



Pinkston.

THE CHALLENGE

The new normal created by COVID-19 requires businesses to rethink the way they protect employees and visitors throughout the work day. For Pinkston, a leading Washington, D.C. based strategic communications firm, the traditional model of nightly cleaning was not going to cut it in terms of providing a sufficient barrier against aggressive viruses.

THE SOLUTION

- Cleanse Downlights in the kitchen, restrooms and dining/meeting areas
- Cleanse Troffer in the kitchen

THE RESULTS

“We are confident that when they return, our employees and visitors will be entering what we believe to be the safest office environment on the planet, and a model for the new standard in office safety and health,” said Christian Pinkston, founder and partner.

TOM DOLAN SWIM SCHOOL

THE CHALLENGE

The Tom Dolan Swim School is a state of the art swim facility that teaches swimmers of all ages. The school wanted to create a bright and engaging space with circadian lighting. And because of the high volume of clients that visit the facility, they also wanted to ensure a healthy and clean environment in their family locker room.

THE SOLUTION

Azul™ Series Troffers & Linears, Good Day&Night® Series Downlight, Cleanse® Air-Sanitizing Troffers

THE RESULTS

The contrast between the lighting and air quality of the new facility versus another existing facility has earned praise from the owners, staff and clients. The employees specifically have noticed a significant improvement in feeling alert and refreshed throughout the day.

THE SONDER ACADEMY

THE CHALLENGE

The Sonder Academy is a private school seeking mindful, innovative solutions for children and families impacted by Autism Spectrum Disorder by implementing educational, therapeutic, and family support programs. First approached to understand more about Healthe's circadian lighting products, the conversation soon after turned to other ideas to improve wellness for the students and staff, where absentee rates for both teachers and students impact progress.

THE SOLUTION

Cleanse® Air-Sanitizing Troffer

THE RESULTS

Installed throughout the school, Cleanse has decreased the levels of bacteria, viruses, and fungi in highly-populated spaces. Teachers who have reported allergy-related illness are reporting they have felt better and been less symptomatic. Data suggests a significant reduction in both student and staff absences with this system.

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APPENDIX

REFERENCES

Far-UVC light efficiently and safely inactivates airborne human coronaviruses
Nature Research; 2020; DOI: 10.21203/rs.3.rs-25728/v1

Long-term effects of 222nm ultraviolet radiation C sterilizing lamps on mice susceptible to ultraviolet radiation
Photochemistry and Photobiology; 2020; DOI:10.1111/php.13269

Far-UVC light: A new tool to control the spread of airborne-mediated microbial diseases
Scientific Reports; 2018; DOI:10.1038/s41598-018-21058-w

Disinfection and healing effects of 222nm UVC Light on methicillin-resistance staphylococcus aureus infection in mouse wounds
Photochemistry and Photobiology; 2018; DOI: 10.1016/j.jphotobio.2017.10.030

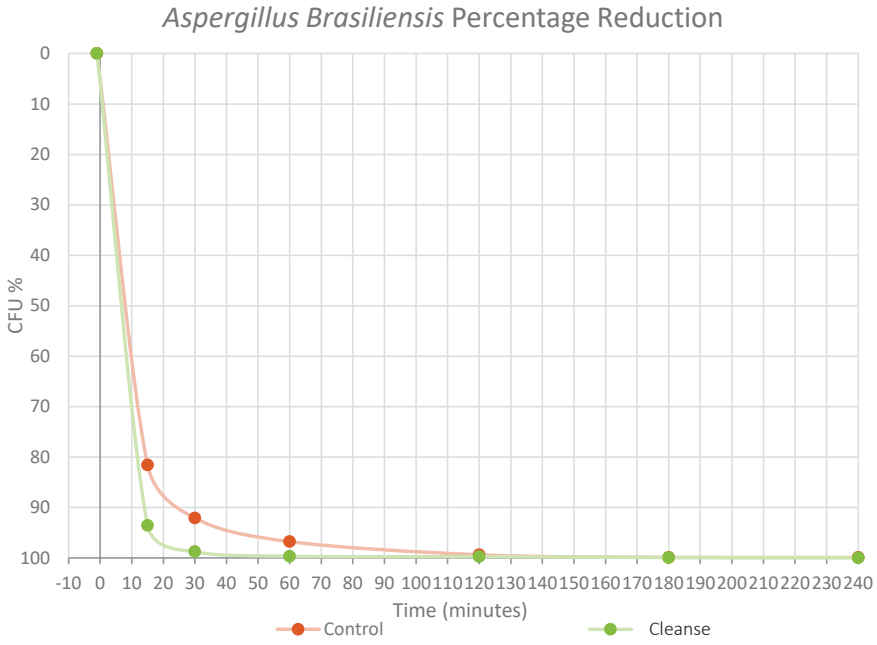
Germicidal efficacy and mammalian skin safety of 222nm UV light
Radiation Research; 2017; DOI:10.1667/RR0010CC.1

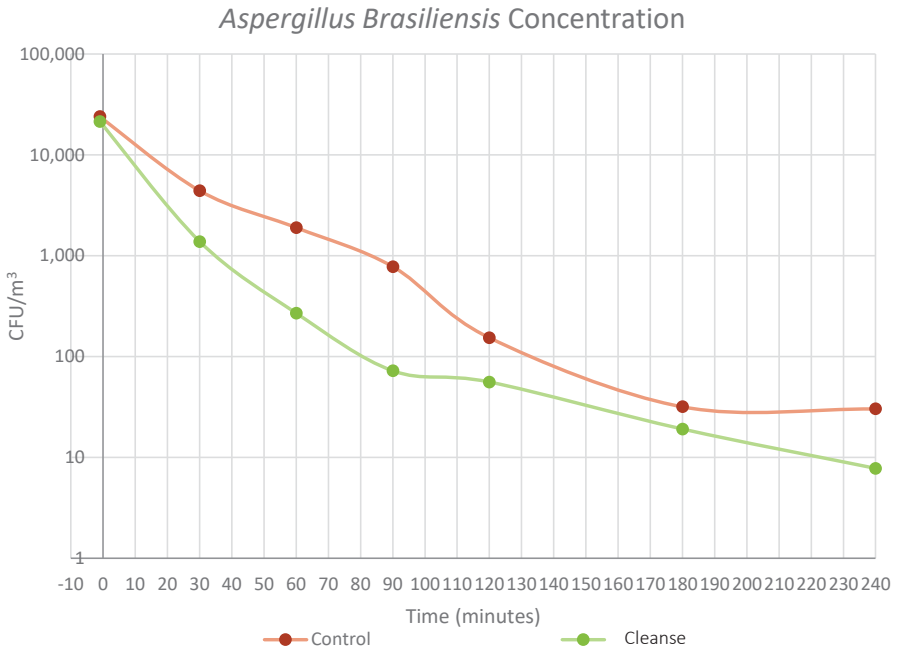
RETURN TO UV EFFECTIVENESS
RETURN TO UV SAFETY

LAB VALIDATION

AIR SANITIZING TROFFER

Percent and absolute reduction in aerosolized **ASPERGILLUS BRASILIENSIS FUNGI** over a 4 hour period





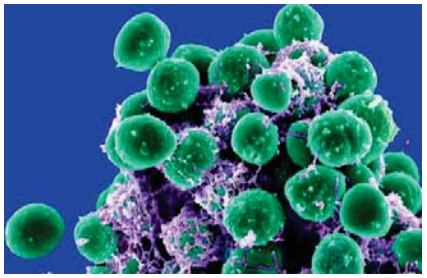
RETURN

THE RESULTS

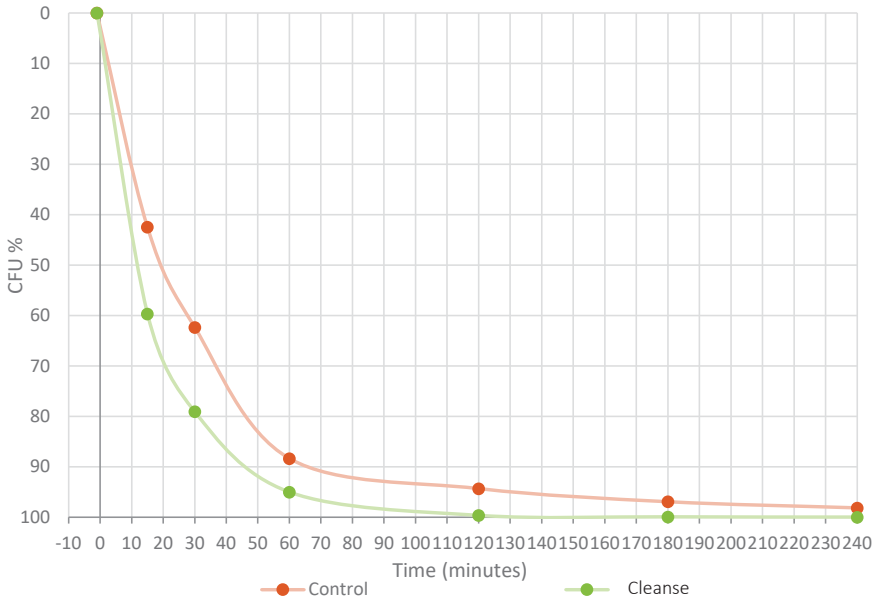
LAB VALIDATION

AIR SANITIZING TROFFER

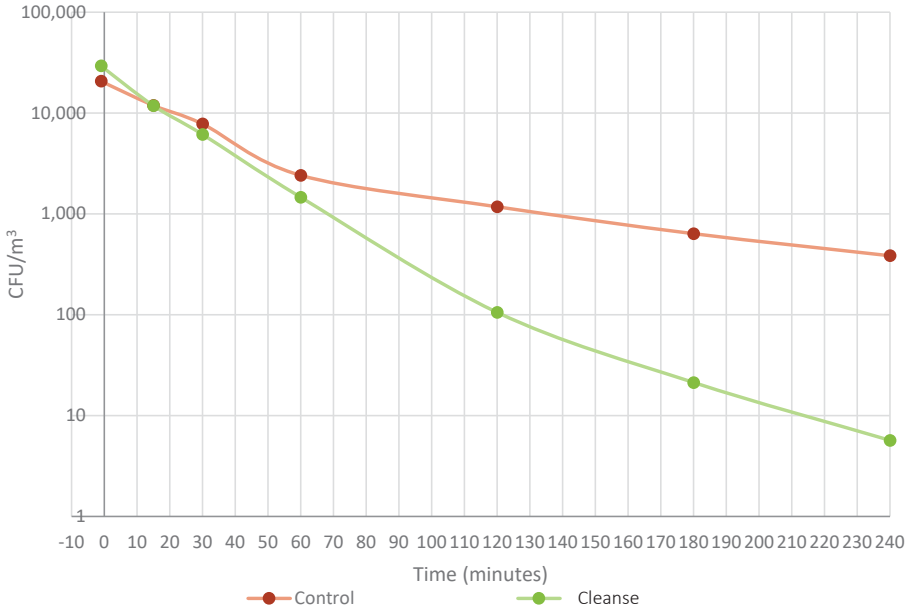
Percent and absolute reduction in aerosolized **STAPHYLOCOCCUS EPIDERMIDIS BACTERIUM** over a 4 hour period



Staphylococcus Epidermidis Percentage Reduction



Staphylococcus Epidermidis Concentration



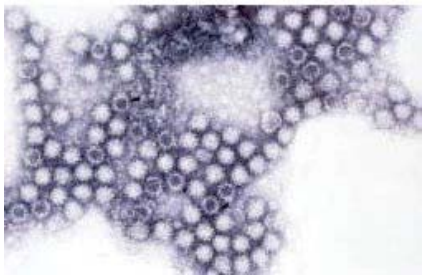
RETURN

THE RESULTS

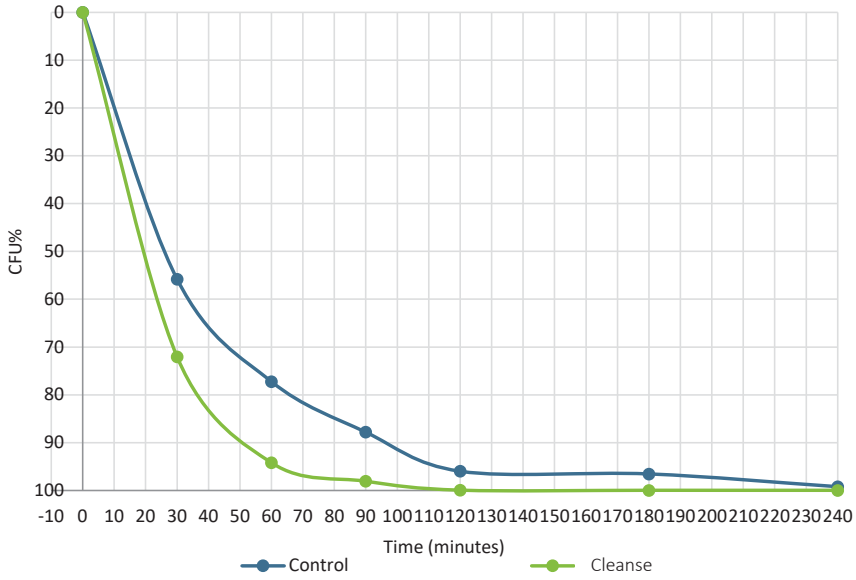
LAB VALIDATION

AIR SANITIZING TROFFER

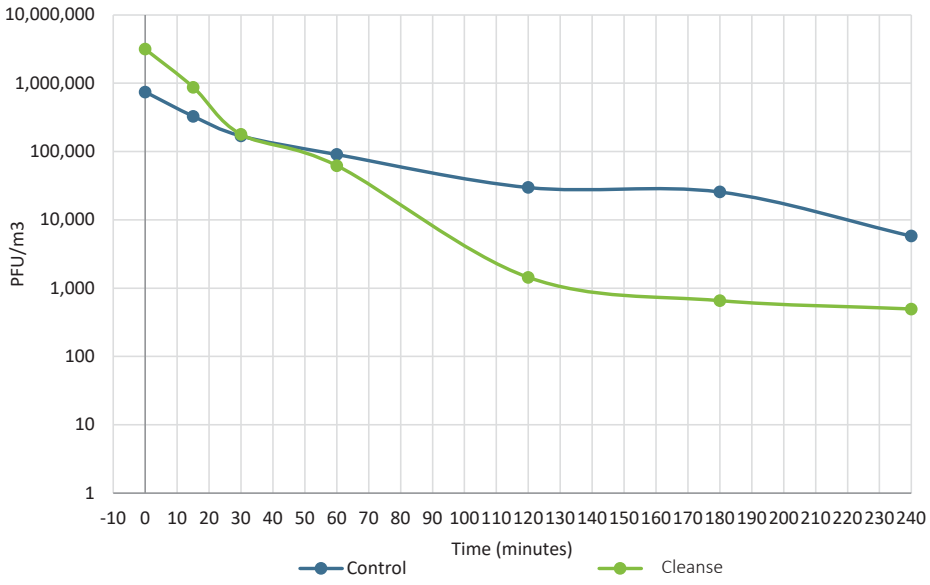
Percent and absolute reduction in aerosolized **FELINE CALICIVIRUS** (proxy for human norovirus) over a 4 hour period



Feline Calicivirus Percentage Reduction



Feline Calicivirus Concentration



RETURN

THE RESULTS

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