

UV-C FOR COIL MAINTENANCE

SAVING ENERGY &
IMPROVING IAQ



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OVERVIEW:

- ▶ Coil Maintenance
 - ▶ Industry Guidance
 - ▶ ASHRAE Perspective
- ▶ How UV-C restores cooling capacity
- ▶ Fouled/Dirty Coils
 - ▶ Attract dust and bacteria
 - ▶ Prevent efficient heat transfer
 - ▶ Energy-intensive systems must compensate



INDUSTRY ENDORSEMENT:

- ▶ UV-C Listed:
 - ▶ ASHRAE **Systems** Handbook (Ch. 17)
 - ▶ ASHRAE **Applications** Handbook (Ch. 62)
 - ▶ **Building Systems** ANSI/ASHRAE/ACCA

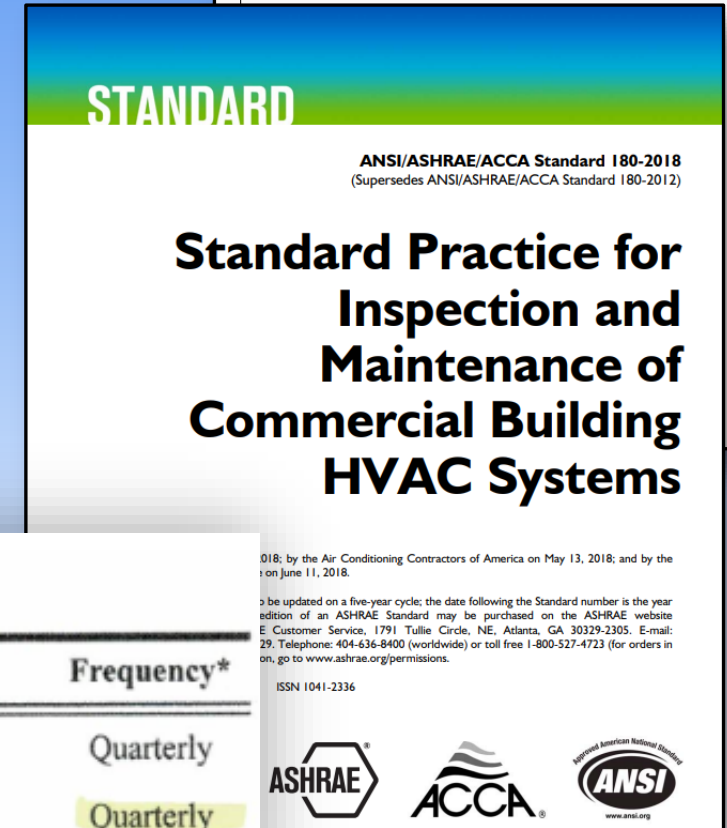


TABLE 5-2 Air Handlers

Inspection/Maintenance Task	Frequency*
a Check for particulate accumulation on filters. Clean or replace as necessary to ensure proper operation.	Quarterly
b Check ultraviolet lamp. Clean or replace as needed to ensure proper operation.	Quarterly

2018; by the Air Conditioning Contractors of America on May 13, 2018; and by the
 on June 11, 2018.

to be updated on a five-year cycle; the date following the Standard number is the year
 edition of an ASHRAE Standard may be purchased on the ASHRAE website
 E. Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail:
 29. Telephone: 404-636-8400 (worldwide) or toll free 1-800-527-4723 (for orders in
 on, go to www.ashrae.org/permissions.

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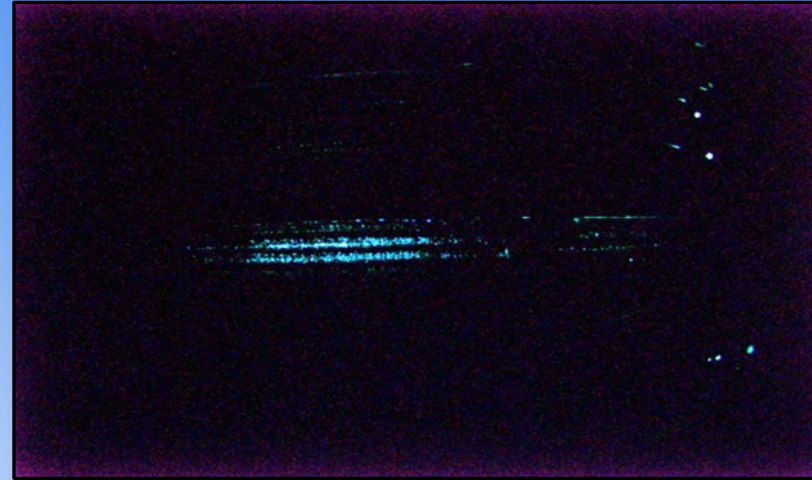
ASHRAE PERSPECTIVE:

- ▶ **Chemical and mechanical cleaning can be costly**, difficult to perform, and dangerous... Furthermore, the system's performance can begin to degrade shortly after cleaning as organic and microbial deposits reappear or reactivate.
- ▶ **UV-C is an easy, cost-effective way to prevent the growth of bacteria and mold** on system components and keep surfaces clean continuously rather than “periodically restoring fouled surfaces.” This means lower maintenance cost and, potentially, better HVAC system performance.
- ▶ Removing and suppressing the formation of biofilms on coils should **reduce airside pressure drop, increase heat transfer coefficient, and reduce fan and refrigeration system energy consumption.**

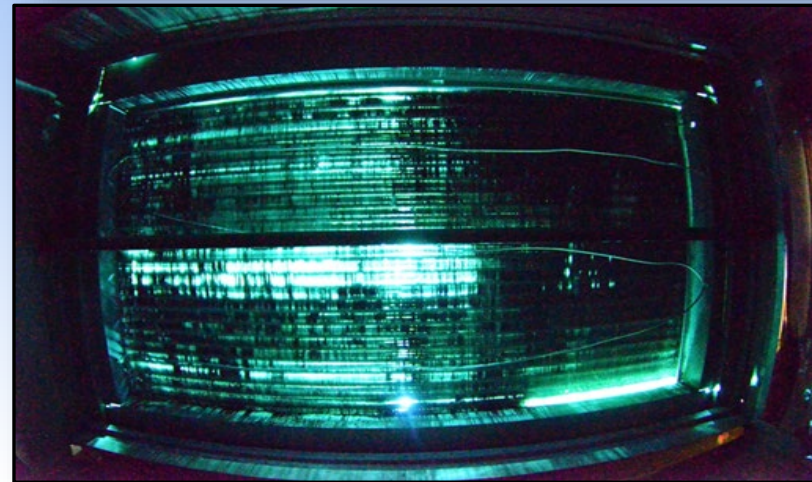


ASHRAE RESEARCH:

- ▶ Research study 1738 measured the **change in HVAC performance after treatment with UVGI.**
- ▶ **21% decrease** in mean coil airside pressure drop
- ▶ **14% increase** in mean overall heat transfer coefficient (UA)



PRE UV-C



POST UV-C



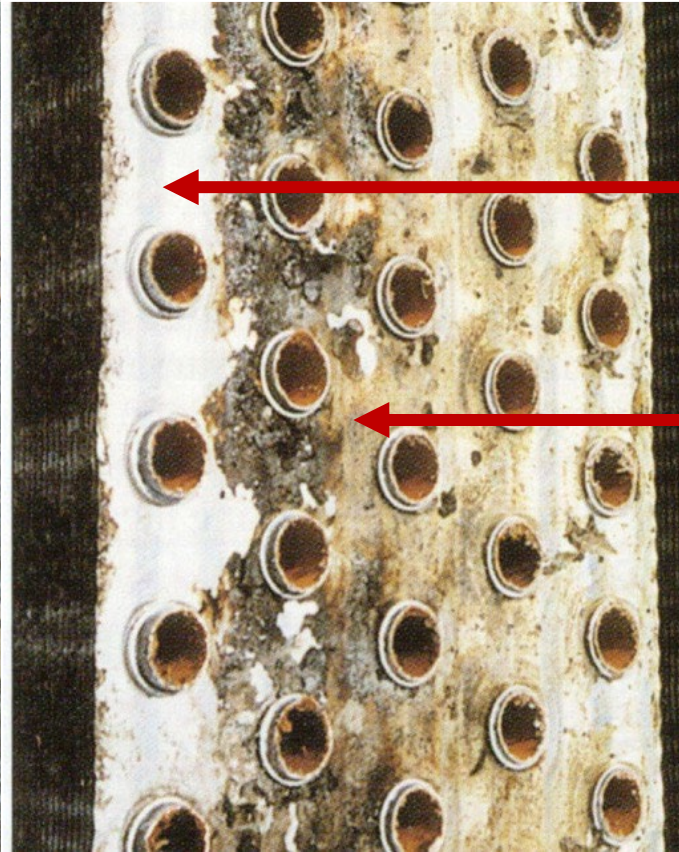
FOULED/ DIRTY COILS:



FOULED/ DIRTY COILS:



MECHANICAL CLEANING:



Front of coil
is clean

Biogrowth
continues to
proliferate



EFFICIENCY "THIS CLOSE": *Interstitial Velocity*

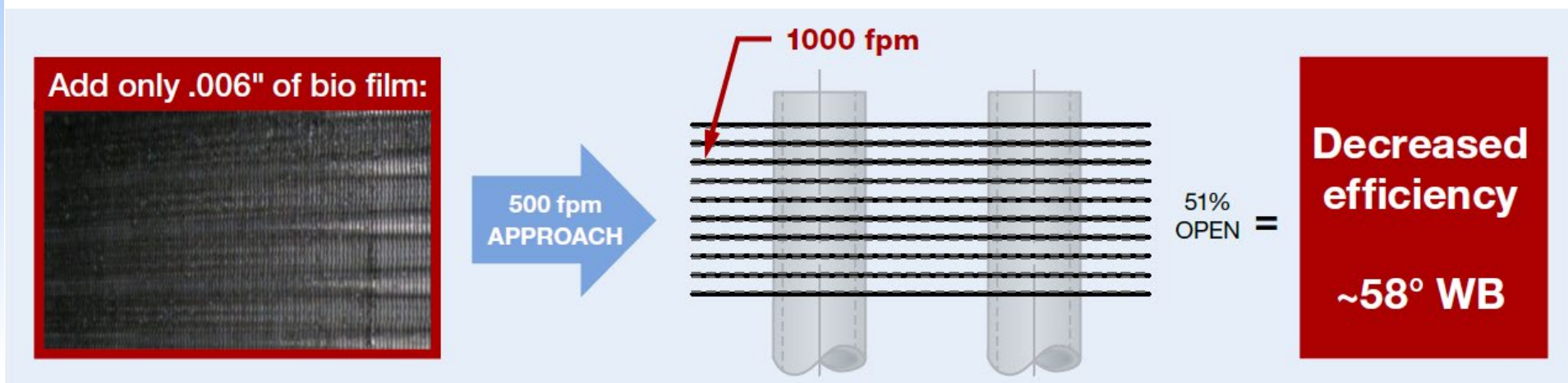
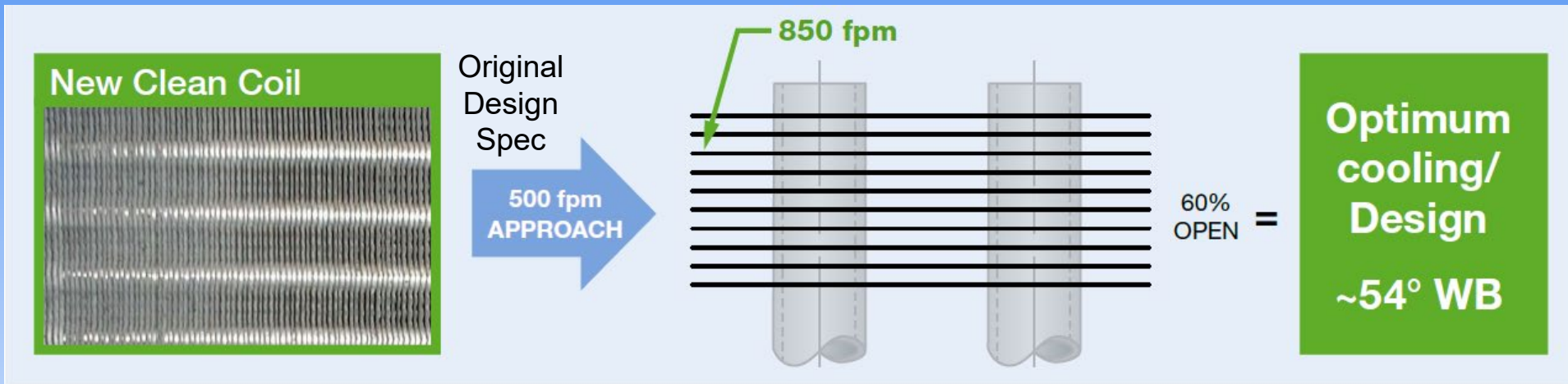
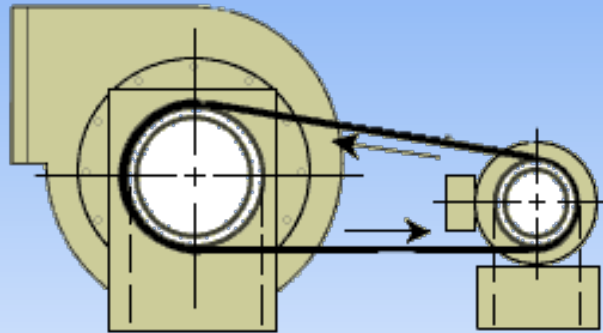


Illustration is based on an 8-row coil with 10-fins-per-inch



COMMON COMPENSATIONS:

Speed up Fan



Increased kWh Usage on Fan Motors



Pump More Chilled Water



Increased kWh Usage on Pump Motors



Lower Coil Water Temp



Significantly Increases kWh Usage on Chiller

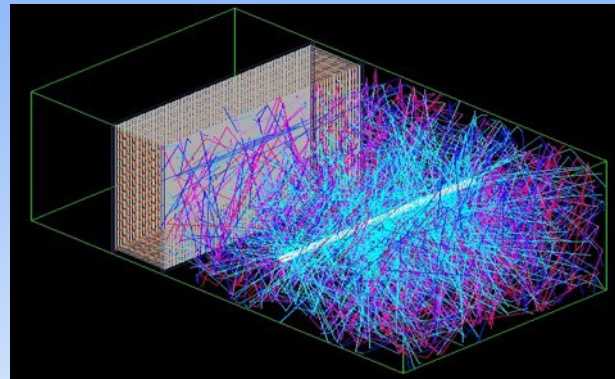


RESTORING COOLING EFFICIENCY:

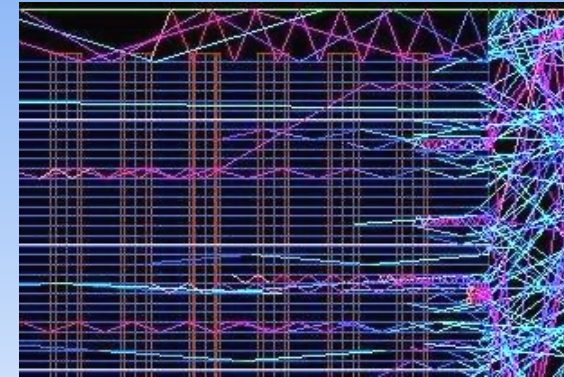
**UV-C on
the coil**



**UV-C energy degrades
organic matter**



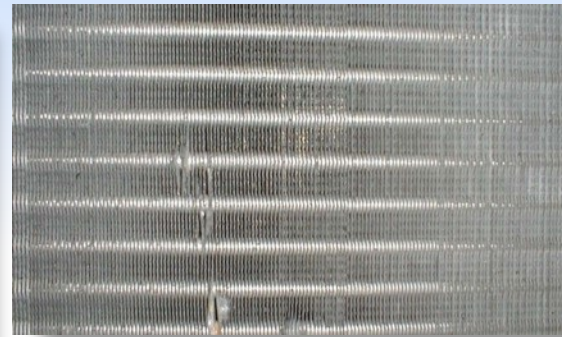
**Energy is reflected
through the coil**



Week One



Week Five



UVR
UV RESOURCES



RETURN ON INVESTMENT:

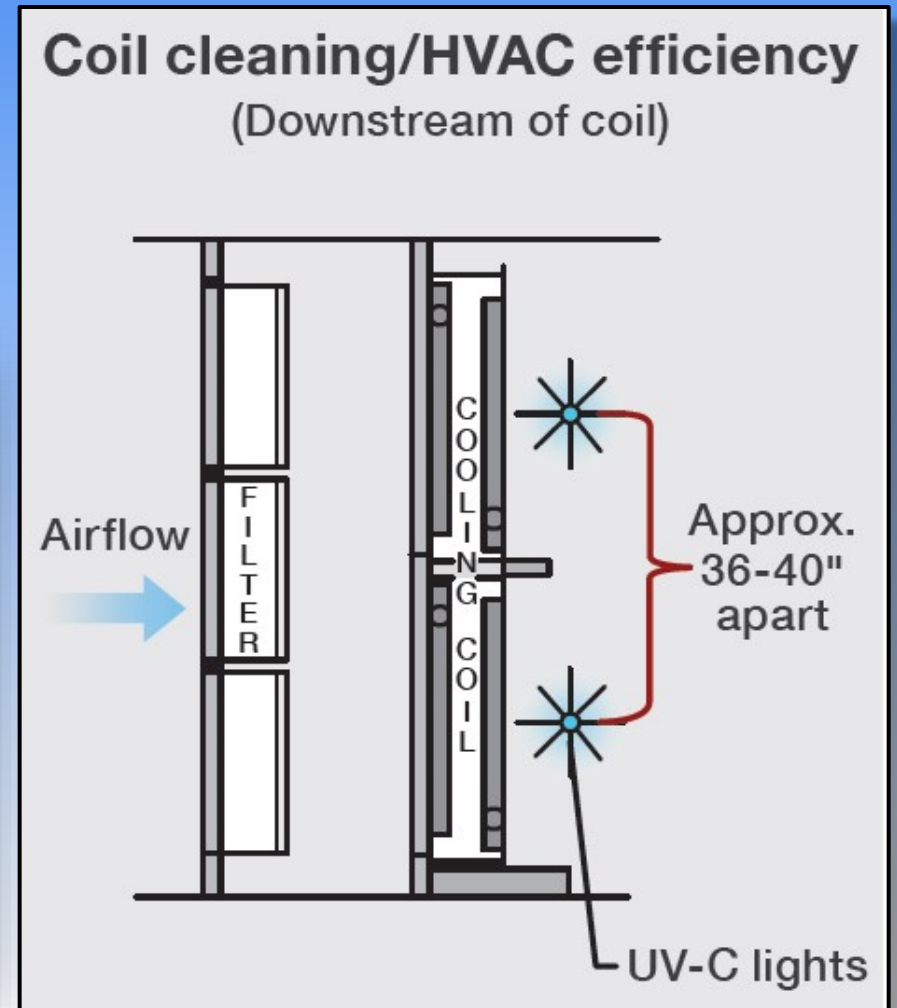
	Before	After	Net Change
Date Sampled:	1/15/2015	2/15/2015	31 DAYS
CFM - Measured or Selected (VAV)	20,000	22,000	2,000
Entering Air Temperature - Dry Bulb °F	78.0	78.0	-
Entering Air Temperature - Wet Bulb °F	67.0	67.0	-
Leaving Air Temperature - Dry Bulb °F	63.0	63.0	-
Leaving Air Temperature - Wet Bulb °F	51.0	50.0	(1.0)
Total Cooling Capacity - Btuh	968,400	1,120,680	152,280
Sensible Heat -Btuh	324,000	356,400	32,400
Latent Heat - Btuh	644,400	764,280	119,880
Net Cooling Gain/Loss - Btuh		→	152,280
Pressure Drop "Across Coil" ("WG)	1.1	0.9	0.20
Pressure Drop BHP Reduction			1.154
Annual Improvement (kWh cost)			\$ 4,607.24
Total Annual Improvement			\$ 4,607.24



SIZING UV-C SYSTEMS:

► Plenum dimensions
(downstream side of
cooling coil)

- Height
- Width



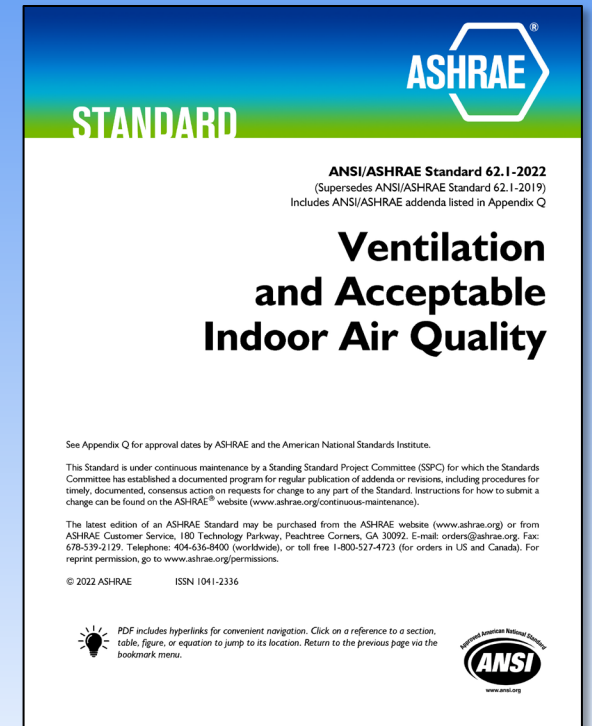
241: CONTROL OF INFECTIOUS AEROSOLS

▶ Min. equivalent clean air (ECA) requirements to reduce airborne disease transmission:

- **During periods of elevated risk** or in
- Facilities with higher baseline risk

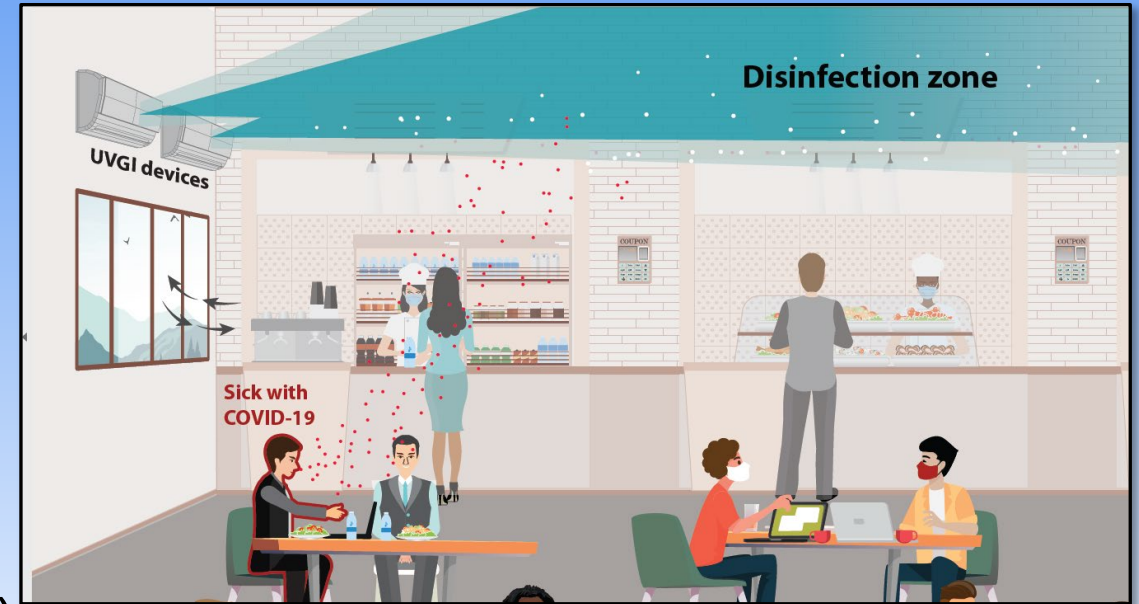
▶ **Prerequisite:** ASHRAE 62.1
Ventilation & Acceptable Indoor Air Quality:

- Minimum IAQ and Ventilation Rates
- Defines acceptable IAQ as:
 - No known air contaminants at harmful levels, (as determined by cognizant authorities)
 - >80% of bldg. occupants approve



241: CONTROL OF INFECTIOUS AEROSOLS

- ▶ Equivalent clean air (ECA) during **Infection Risk Mitigation Mode** -- combined effect of:
 - ventilation
 - filtration
 - air cleaning
- ▶ AHU filtration upgrades and local air cleaning (such as Upper-Room UVC) is far less energy-intensive than increasing outside air levels



QUESTIONS?



The Leader in UV-C Disinfection & HVAC Efficiency

Email: UVR.info@UVRresources.com

