WFI Webinar









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Managing Indoor Air Quality in the COVID19 Era: Strategies for Safety and Efficacy

Jim Rosenthal Chairman and CEO Tex-Air Filters





Ellie Amirnasr, PhD CEO at qlair



Wednesday, September 9th, 9:00 – 10:00am CT

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Speaker Introduction



Jim Rosenthal

- Jim Rosenthal, CAFS
- Chairman & CEO at Tex-Air Filters
- He has over 20 years of experience in the air filtration and environmental control industries and has been active in the National Air Filtration Association (NAFA) – serving as its President in 2009-2010.
- Certified Air Filter Specialist (CAFS) by NAFA.
- He is also involved in air filter test standards and is currently a voting member of the ASHRAE 52.2 Committee.



Managing Indoor Air Quality in the Era of Covid-19: Strategies for Safety and Efficacy

Jim Rosenthal, CAFS

CEO at Tex-Air Filters



Recommended Steps to Lower Risk of the Spread of COVID-19

- Wear masks
- Wash Hands
- Socially distant
- Avoid Crowds (or stuffy rooms)
- Outdoors is better than indoors
- Improve Ventilation as much outside dilution air as possible
- Improve Filtration both ASHRAE and the CDC recommend going to MERV 13 or above – if possible.



Testing with NaCl Spray to Determine Potential Exposure to Aerosols

The spray of NACL simulates a sneeze or a cough. A full range of particle sizes are created from +100 um to less than 1 um. Aerosol particles containing Covid-19 are • INE & • All Rights Reserved © All Rights Reserved © All Rights Reserved • All Rights Reserved © All Rights thought to be in the 1-5 um range. These particles stay in the air for an extended period of time.



Avoid Small, Poorly Ventilated Rooms



Room Size Makes a Difference



Aerosol Particle Count with Air Cleaner



Aerosol Particle Count in 10'X12' Room with Open Doors and **Air Cleaner**





All Rights Reserved © All Rights Reserved "Wired" Article – August 6, 2020 "Could a Janky, Jury-Rigged Air Purifier Help Fight Covid-19? Indoor-air experts think: Sure, maybe. Why the hell not? We convinced the CEO of an air filter company to give it a try."



"Box Fan with a MERV 13 Filter" Air Cleaner. How Does it Perform?

					Reserved	
	Room Count	After the Fan and Filter	Removed by Filter	% Removed	ights no	
0.3 um	1,596,900	1,169,100	427,800	26.8%		
0.5 um	167,800	97,100	70,700	42.1%		
1 um	47,900	19,300 II Right	28,600	59.7%		
2.5 um	13,900	3,800	10,100	72.7%		
5 um	2,200	II Rights 300	1,900	86.4%		
10 um	ts Reserved 800	200	600	75.0%		
Particle counts taken with a Lighthouse Handheld 3016-IAQ Particle Counter.						



How Much Air Does it Move?

Filton		
Filter	FIOW Rate	
		K
No Filter	780 feet per minute	110
	Reserved	C M
1" MERV 13 Filter	320 feet per minute	
	cerved © All the	
2" MERV 13 Filter	400 feet per minute	
NIA O bain	(19.	
4" MERV 13 Filter	460 feet per minute	
C All Rights		

Readings were taken with a handheld anemometer at 24" from the fan. Three readings were taken with each variation and then averaged.



"Box Fan with MERV 13" Air Cleaner - Breakroom

							sts Reserve
	Outside	8:30	10:30	12:00	3:00	4:00 A	Rights
0.3um	1,343,200	733,200	501,300	460,000	338,500	228,100	
0.5um	178,200	73,900	40,400	35,200	45,200	21,100	
1um	84,200	11,500	10,500	10,200	11,500	5,500	
2.5um	21,100	2,200	2,200	2,500	2,100	1,000	
5um eserve	2,800	300	100	300	200	0	
10um	1,300	100	0	200	100	0	

© Waterloo Filtration Institute 2020

Fan running continuously at Medium speed.

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"Box Fan with MERV 13 Filter" Office – Very Light Traffic

		12:50	3:30	5:30	, Right's Reserved
	0.3um	2,237,800	584,900	191,500	
	0.5um	114,500	25,800	9,900	
	1um	24,800	Rights Reserved	3,600	
	2.5um	11,100	3,800	1,200	
	Sum Sum	3,800	1,400	200	
© All Righ	10um	2,300	1,100	200	



Start with 5 MERV 13 Filters



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Assemble the Box to Attach to the Fan



A Variation on the "Box Fan with MERV 13 Filter" Air Cleaner



Box Fan with MERV 13 Filter Box – Side View



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How Did the Box Fan with MERV 13 Filter Box Perform?

580 Feet Per Minute Secenced © All Rights Reserved © All Rights Reserved



The Adventures of Hairy Manne



What Happens When Airflow Hits the Face Shield at Walking Speed?



Why You Should Always Wear a Mask with a Face Shield



The Flow of Air Going Around the Shield Creates Negative Pressure Behind the Shield



Always Wear a Face Mask with a Face Shield



Thank You



Speaker Introduction



Ellie Amirnasr, PhD

- Ellie Amirnasr, PhD
- CEO at qlair
- Dr. Ellie Amirnasr is a fiber and polymer scientist with more than 10 years experience in filtration technologies and clean air solutions.
- At qlair, she is dedicated to helping facility management professionals be more efficient in their building operations and indoor environment control.



Managing Indoor Air Quality in the Era of Covid-19: Strategies for Safety and Efficacy

Dr. Ellie Amirnaser

CEO of qlair



qlair

Intelligent Air Quality Solutions for Schools 1. Identify and understand facility management strategies addressing post COVID19 reopening for addressing these common challenges.

2. Discover new ways to increase your building's operating efficiency and environmental safety with technology.

3. Implement a data driven approach to both indoor air quality management and HVAC system optimization.



• • • • • • • • • • •

Current challenges for facility executives.

Facilities executives and managers are tasked with:

 ✓ Developing a plan for a safe and smooth reopening amid COVID-19.

 Ensuring health and safety guidelines are met with diligence after reopening.

 Preparing equipment to operate correctly and efficiently.

... all while ensuring costs are not significantly increased.





Sources: https://www.livescience.com/how-covid-19-spreads-transmission-routes.html https://www.youtube.com/watch?v=H2azcn7MqOU&t=12s

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Indoor air quality's impact on safety and reopening.

"The transmission of Sars-CoV-2 through the air is sufficiently likely that airborne exposure to the virus should be controlled.

Changes to building operations, including the operation of heating, ventilation, and air-conditioning (HVAC) systems, can reduce airborne exposures." - ASHRAE

"A small increase in long-term exposure to PM2.5 leads to a large increase in the COVID-19 death rate. Our results underscore the importance of continuing to enforce existing air pollution regulations to protect human health both during and after the COVID-19 crisis." –HARVARD

"The airflow direction was consistent with droplet transmission. To prevent the spread of the virus in buildings, we recommend increasing the distance between tables and improving ventilation." - CDC



Indoor air quality in the news

Forbes	Billionaires Innovation Leadership Money Business Small Business Lifestyle Lists Advisor	WRALF com	Reserved
С	Views 1 Jun 10, 2020, 00:17pm ED1 ovid-19 Catapults Indoor Air Quality o Top Of The List Guidehouse Insights Contributor Navigant Research Contributor Group O Energy	Duke researchers develop calculate of airborne transmission in classroe	or to examine risk oms
1244/4420		ights Reserve	A-Z Index
CDC 24/7: Saving Lives, Protecting People™		Search	Q
EWE	RGING INFECTIOUS DISEASE	IS [®]	N: 1080-6059
Volume Researc	26, Number 7—July 2020 h Letter		
COVIE China	0-19 Outbreak Associated with Air Conditionii , 2020	ng in Restaurant, Guangzhou,	WFI
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Air Quality Related Strategies to Reopen Safely



1. Building Ventilation

Outdoor Ventilation provided by heating, ventilating, and air-conditioning 0 (HVAC) systems can reduce the airborne concentration of SARS-CoV-2 and thus the risk of transmission through the air.

2. Mechanical Filtration

• Mechanical filter efficiency is recommended to be at least MERV 13 and preferable MERV 14 or better to help mitigate the transmission of infectious © All Rights Reserved © aerosols.

3. Retrofit Solutions

Retrofit solutions like portable room air cleaners with HEPA filters and UVGI (ultraviolet germicidal irradiation) are recommended in addition to central filtration system upgrade to help mitigate the transmission of infectious aerosols.



All Rights Reserved "High ventilation results in high energy consumption."

• How can we optimize with no compromise on safety?

Rights Reserved © All Rights "Feasibility of increasing mechanical filtration to MERV 13 due to HVAC capacity."

What are the alternatives?

"What's the need for a retrofit solution?"

Which solution fits school space? 0

To make an informed decision on ventilation and purification strategies, continuous air quality monitoring is key.

We live in a data-driven world.

...and facility management is no different.



Reduce the Risk of Virus Airborne Transmission, Efficiently

Tracks harmful pollutants in your space to reduce risk of virus spread.

- The likelihood of airborne transmission of infection indoors can be estimated and reduced by continuous CO₂ measurement
- The risk of airborne transmission can be calculated by continuous PM2.5 measurement
- Improve air filtration and purification systems proactively by continuous monitoring of air quality parameters



qlair adjusts level of ventilation, optimizes occupancy rate, and provides the right filtration and purification solution to create **safe** and **efficient** indoor environment.



Do you have the right filter for your building?

Tracking Outdoor Air Pollution's Effect on Indoor Air Quality

To protect your building from outdoor air pollution, you need to equip your HVAC system with the right filter class.



Case Study: Do you have the right filtration system for your building?



Reduce risk of virus spread by improving indoor air quality.

"A small increase in long-term exposure to PM2.5¹ leads to a large increase in the COVID-19 death rate. Our results underscore the importance of continuing to enforce existing air pollution regulations to protect human health both during and after the COVID-19 crisis." - HARVARD

The continuous measurement of PM2.5 levels allows you identify the effectiveness of your indoor ventilation and filtration.

Due to COVID-19 concerns, it is recommended that PM2.5 levels do not exceed 10 ug/m³.

¹Particulate Matter (PM2.5): Also known as fine dust, Particulate Matter (PM2.5) are inhalable particles that can penetrate deep into the lungs.



Sources: <u>https://projects.iq.harvard.edu/covid-pm</u> | <u>https://www.ashrae.org/technical-resources/resources</u>

Safe Occupancy Rate of Classrooms

What does it mean when we say...

Outdoor Ventilation can reduce the airborne concentration of SARS-CoV-2 and thus the risk of transmission through the air.



In a closed space with low ventilation (fresh air) rate, there is a higher chance of rebreathing exhaled air. increasing ventilation rate reduces exposure to exhaled breath.

Indeer CO_2 measurement is a dynamic measure of the number of people in the space exhaling CO_2 and the amount of low concentration outside air introduced by ventilation.

 As a result the CO₂ concentration in a space can be directly related to a ventilation rate per-person in the space, therefore it directly corelate with virus concentration



Sources: https://airtest.com/support/reference/note4.pdf

Source: https://onlinelibrary.wiley.com/doi/epdf/10.1034/j.1600-

0668.2003.00189.x

Ventilation and Occupancy Optimization

How many people should you allow in a classroom?

Tracks harmful pollutants in your space to reduce risk of virus spread.

ved © All Rights Reserved The likelihood of airborne transmission of infection can be estimated and reduced using continuous CO₂ measurement

Classroom information

Room size: 35'W x 35'L x 10'H (12,250 ft³)

Average fresh air flow rate: 450 cfm

Air exchange per hour (ACH): 6 ACH (recommended by

Optimization Result med © All Rights Reserved © All Rights Reserve Target level of CO₂: <800 ppm

Max. number of people allowed in the space: 22



Modern Indoor Air Quality Management



AIR QUALITY MONITORING

Lard Sts Reserved © All Rights Reserved Tracks harmful pollutants in your space to reduce risk of virus spread. Industry standard recommended levels are:

- Humidity level should be kept between 40-60%
- Fine dust (PM2.5) level should be below 10ug/m3
- Carbon Dioxide (CO2) should be below 800 ppm

PARTICLES (PM2.5)



PM2.6 is often external to as the plast, and redeer levels are manty inflammed by mattery any political and menintel Using the compatibility of these can impericantly vertices (PMD 5 comparisons indoors, PMD 5 comparison



A review of the assisting filtration velocit for your variabilities reaches in MpMy measuremented. The saming PMLR conversionly used by the MS for the saming PMLR is represented by the MS for the MS of Experies. Fyico and referenced on petiting your hundling cardinal contact

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Analyze Data

ights Reserved © All Rights Reserved © As you identify trends in your air quality over time, you will be able to identify critical areas for improvement.

"The average indoor PM2.5 levels are high. Productivity and well being of people indoors will be affected negatively. A review of the existing filtration setup for your ventilation system is highly recommended..."

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Managing Indoor Air Quality in the COVID19 Era: Strategies for Safety and Efficacy

Questions ?





CEO at qlair

Thank You so much for Your Participation



Jim Rosenthal Chairman and CEO **Tex-Air Filters**



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16 distinguished speakers in 4 sessions:

- Emerging Challenges and Responses
- IAQ and the Built Environment
- Facemask Technologies and Latest Developments
- Facemask/Air Filter Test Methods and Standards

IAQ Health and Safety Solutions Associated with COVID-19

WFI 2020 Annual Virtual Conference December 15-16, 2020, 8a-12p, EST

Acknowledgement of WFI Members



Thank You for Your Attention

For Questions, Contact Us

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