Please make sure your line is muted at all times

Questions can be asked with the chat feature that will be visible only for presenters

Calls will be recorded and recordings will be shared

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CHALLENGES TO INFECTION CONTROL IN HEALTHCARE FACILITIES

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MEDPIPE

WELCOME AND INTRODUCTION FROM HILTI

SPEAKERS

Senior Trade Manager

Paul Papineau

Senior Manager - Healthcare Business Development

Daniel Mendez

Director – Business Development

Chris Kusel

Healthcare Business Development

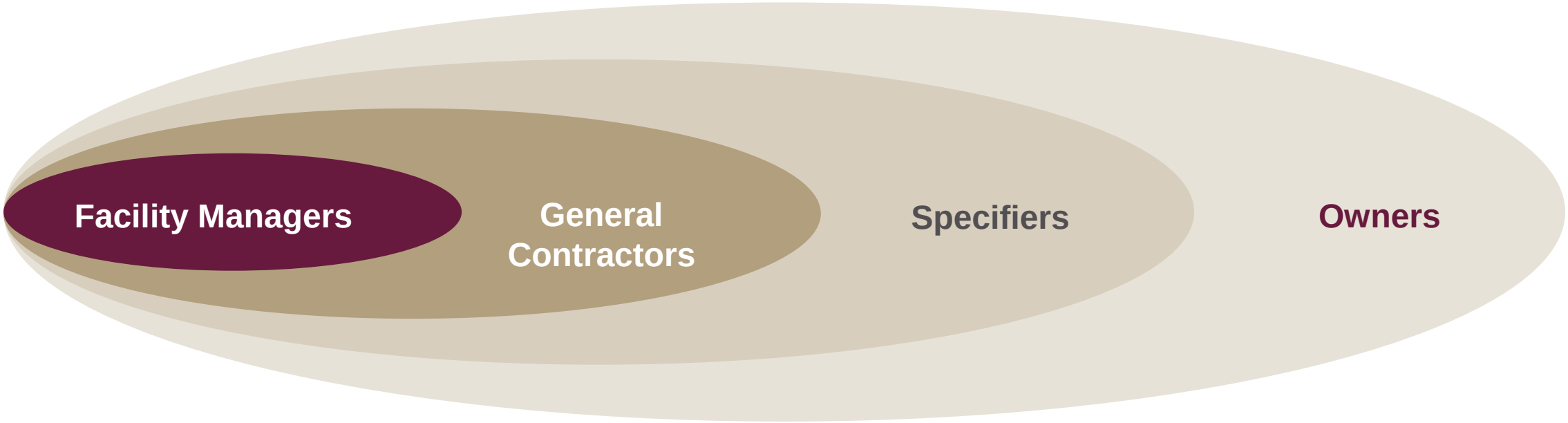
Kim White

GOALS FOR TODAY

- Discuss current challenges with infection control as it relates to airflow management in healthcare facilities
- Overview of how Firestop total barrier management can help reduce airborne infection risk in healthcare facilities
- Share examples and ideas to help improve infection control in critical areas of a healthcare facility

CHALLENGES WITH AIRFLOW CONTAINMENT

HEALTHCARE FACILITY CHALLENGES INFLUENCE OTHERS



HEALTHCARE STAKEHOLDER NEEDS & PAIN POINTS

Key Pain Points

- **Regulatory compliance**
- **Costs**
- **Movement**
- **Water**
- **Acoustics and dust**

Impact

Infection control	Fire/smoke (continuous)	Air pressure (+/-)	Permit/barrier management
Material	Labor (construction & design)	Energy savings	
Joints (vertical & horizontal loads)	Penetrations (expansion/ contractions)	Seismic	
Constructability	Containment	Containment (mold)	
Patient privacy	General noise nuisance	Dust control during MAC	

Infection control and airborne disease spread is a top concern in the healthcare industry

PROPER FIRESTOPPING IN A HOSPITAL ADDS ADDITIONAL VALUE TO INFECTION CONTROL

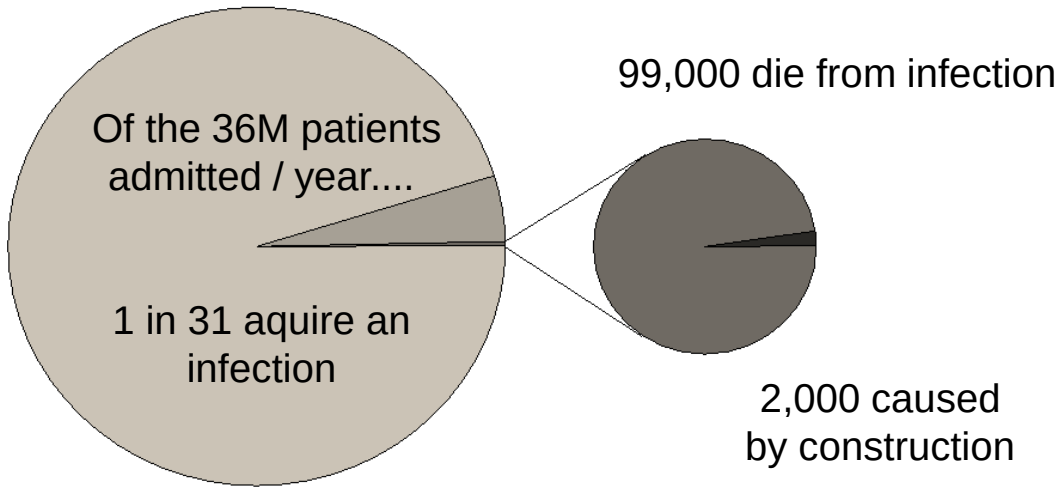
- Passive fire protection
- Fire safety after a seismic event
- Cost pressures

Infection Control

Virtually Fiber-free

Noise reduction

HEALTHCARE INFECTION IMPACT ACCORDING TO CDC



Microorganisms associated with airborne transmission*

Evidence for transmission	Fungi	Bacteria	Viruses
Numerous reports in healthcare facilities	*Aspergillus* spp.+ *Mucorales* (*Rhizopus* spp.)[97, 115]	*Mycobacterium tuberculosis*+	Measles (rubeola) virus[168-170] Varicella-zoster virus[162-166]
Occasional reports in healthcare facilities	*Acremonium spp.*[105, 206] *Fusarium spp.*[102] *Pseudoallescheria boydii*[100] *Scedosporium spp.*[116] *Sporothrix cyanescens*[118]	*Acinetobacter spp.*[161] *Bacillus spp.*¶[160, 207] *Brucella spp.***[208-211] *Staphylococcus aureus*[148, 156] Group A *Streptococcus*[151]	Smallpox virus (variola)§[188, 189] Influenza viruses[181, 182] Respiratory syncytial virus[183] Adenoviruses[184] Norwalk-like virus[185]
No reports in healthcare facilities; known to be airborne	*Coccidioides immitis*[125] *Cryptococcus* spp.[121] *Histoplasma capsulatum*[124]	*Coxiella burnetii* (Q fever)[212]	Hantaviruses[193, 195] Lassa virus[205] Marburg virus[205] Ebola virus†[205] Crimean-Congo virus[205]
Under investigation	*Pneumocystis carinii*[131]	N/A	N/A

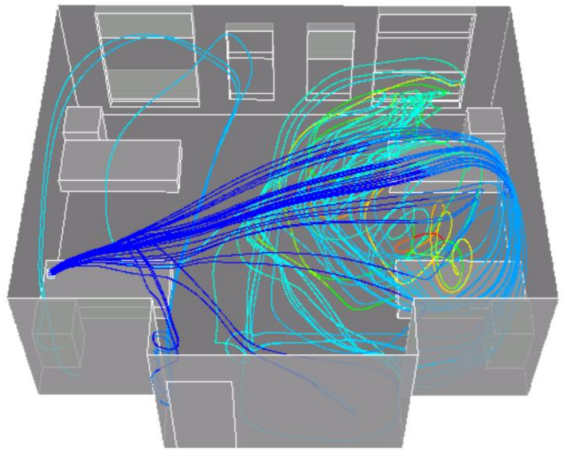
Healthcare infection impacts 5-10% of all admitted patients

Source: Center for Disease Control (CDC) before Covid-19

*This list excludes microorganisms transmitted from aerosols derived from water. Additional footnotes can be found @ https://www.cdc.gov/infectioncontrol/guidelines/environmental/background/air.html#table4

CDC AIRFLOW GUIDELINES FOR INFECTION CONTROL

There are other important factors like temperature, humidity or ventilation. Today, we will focus on pressurization.



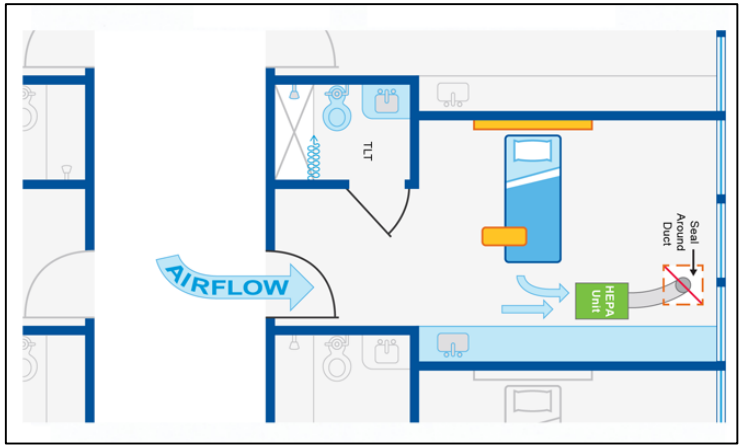
Engineering characteristics	**Positive pressure areas (e.g., protective environments [PE])**	**Negative pressure areas (e.g., airborne infection isolation [AII])**
Pressure differentials	> +2.5 Pa§ (0.01″ water gauge)	> −2.5 Pa (0.01″ water gauge)
Air changes per hour (ACH)	>12	≥12 (for renovation or new construction)
Filtration efficiency	Supply: 99.97% @ 0.3 µm DOP (dioctylphthalate particles of 0.3 µm diameter) Return: none required (If the patient requires both PE and AII, return air should be HEPA-filtered or otherwise exhausted to the outside)	Supply: 90% (dust spot test) Return: 99.97% @ 0.3 µm DOP (dioctylphthalate particles of 0.3 µm diameter); HEPA filtration of exhaust air from AII rooms should not be required, providing that the exhaust is properly located to prevent re-entry into the building.
Room airflow direction	Out to the adjacent area	In to the room
Clean-to-dirty airflow in room	Away from the patient (high-risk patient, immunosuppressed patient)	Towards the patient (airborne disease patient)
Ideal pressure differential	> + 8 Pa	> −2.5 Pa

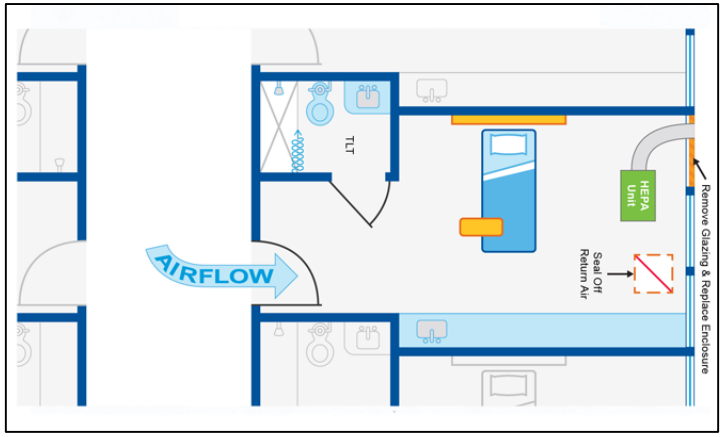
Firestop secondary attributes can greatly contribute to life safety and overall environment of care

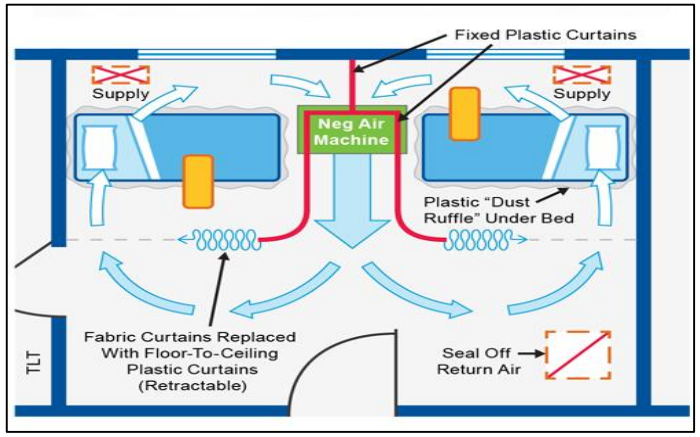
Source: Center for Disease Control (CDC)

METHODS HOSPITALS USE TO EXTRACT AIR IN COVID-19 AREAS

HEPA to return	HEPA to outside	Multi-bed zone-within-zone room





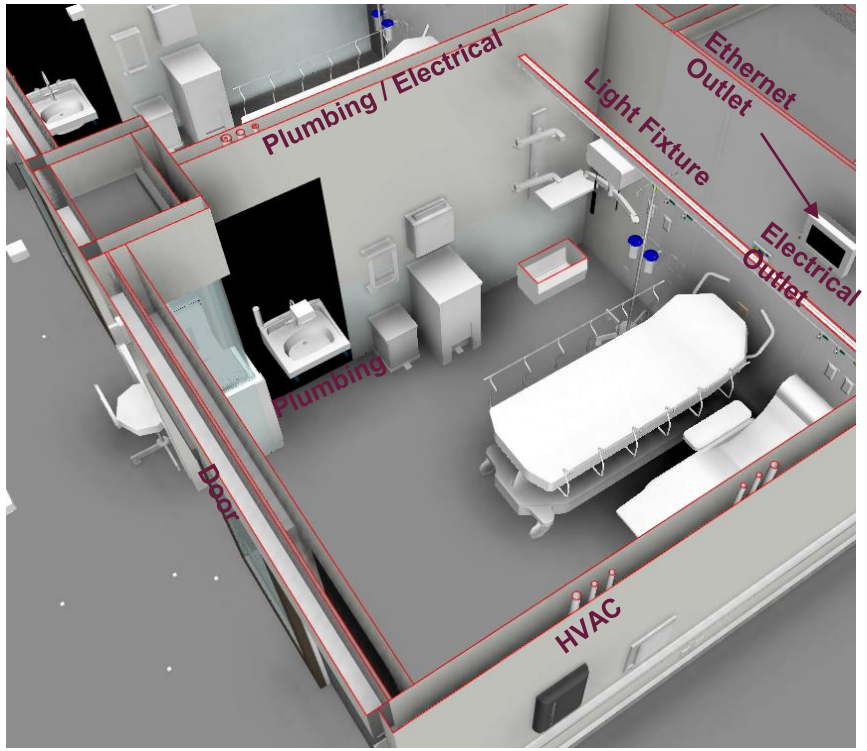


- Understanding airflow control is valuable during a crisis with COVID-19
- During COVID-19 crisis, hospitals use airflow control to maintain patient care and minimize risk

Images sourced from https://www.ashe.org/negative-pressure-rooms

AREAS TO CONSIDER FOR AIRFLOW CONTROL FOR INFECTIOUS DISEASE

Typical rooms



Intensive Care Units

CDC issued guidelines which indicate air flow loss greater than 125 CFM (cubic feet per minute) creates a questionable environment of care.

INDUSTRY GUIDELINES AND STANDARDS FOR HEALTHCARE INFECTION CONTROL

CDC Recommendations:

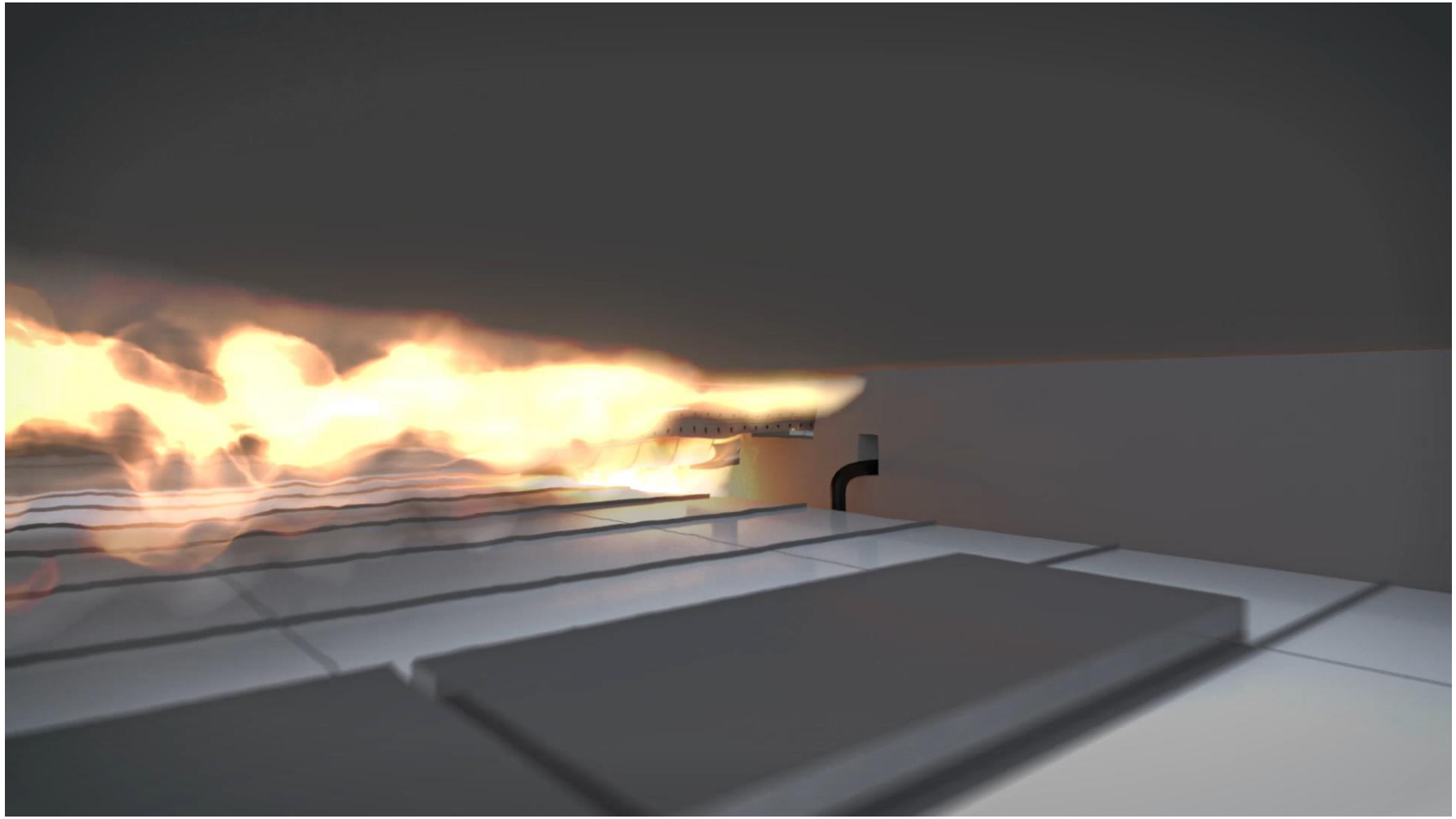
1. Risk assessment activities necessary in maintaining construction barriers, which include daily monitoring of negative airflow within construction and renovation areas within different types of construction barriers

2. Monitoring and documenting daily negative airflow rate in airborne infection isolation rooms (AII) and positive airflow rate in proactive environmental rooms (PE), especially when rooms are occupied with patients

Excess air leakage beyond 125 CFM does not allow for these recommendations to be executed effectively, thus creating a questionable environment of care.

* CDC “Center for disease control”

AIRFLOW SPREAD



AIRFLOW SPREAD: SMOKE PROPAGATION DUE TO A FIRE

In less than 2 minutes the hallways in this hospital were full of toxic smoke ...

FIRESTOP TOTAL BARRIER MANAGEMENT

WHITE PAPER

Andrew Streifel

Hospital environmental specialist

University of Minnesota

Total Barrier Management Reduces Airborne Infection Risk In Healthcare

Prepared by:

Andrew J. Streifel MPH, REHS

Hospital Environment Specialist

Department of Environmental Health and Safety

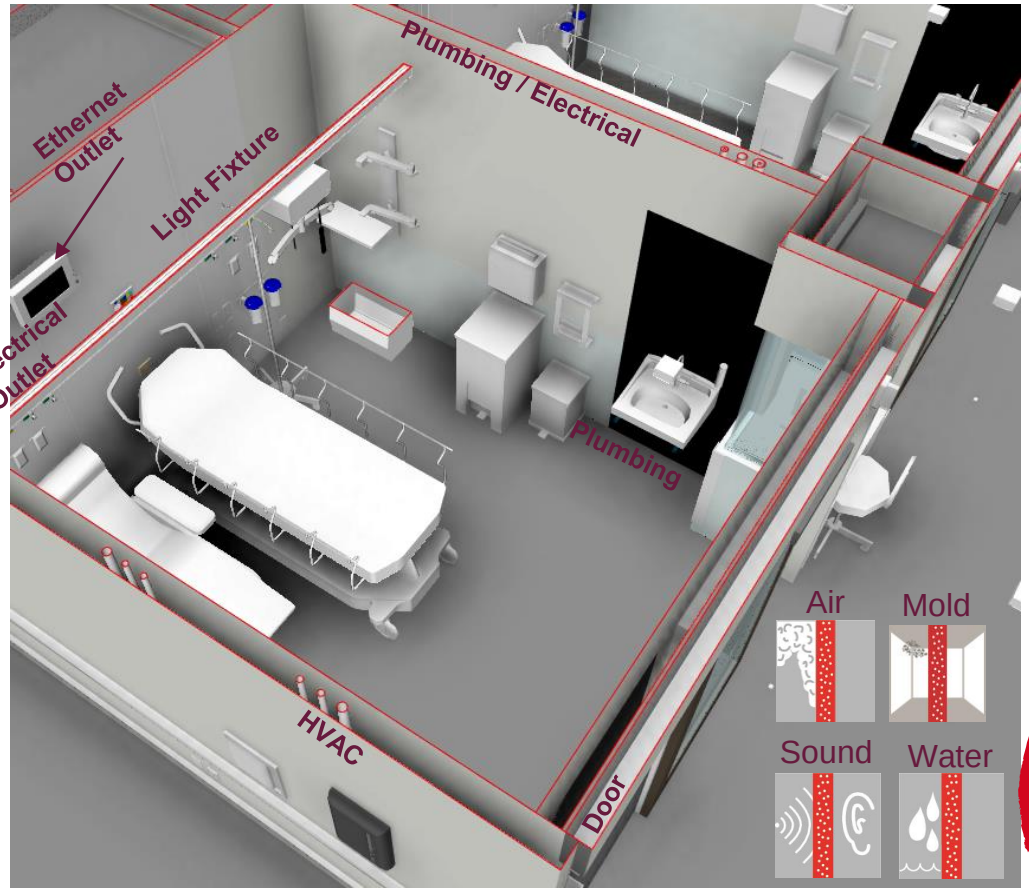
University of Minnesota

Minneapolis, MN

May 15, 2013

Case study provides results of air leakage and supports the need to properly seal critical applications within healthcare facilities

WHAT IS TOTAL BARRIER MANAGEMENT?
BASICS OF FIRESTOP



- **F-Rating**

Duration of time in which flames do not pass though the 1hr, 2hr, 3hr, 4hr firestop systems under test conditions.

- **T-Rating**

Time it takes for the non-fire side of the tested assembly to reach approximately 400°F (325 °F above ambient) under test conditions.

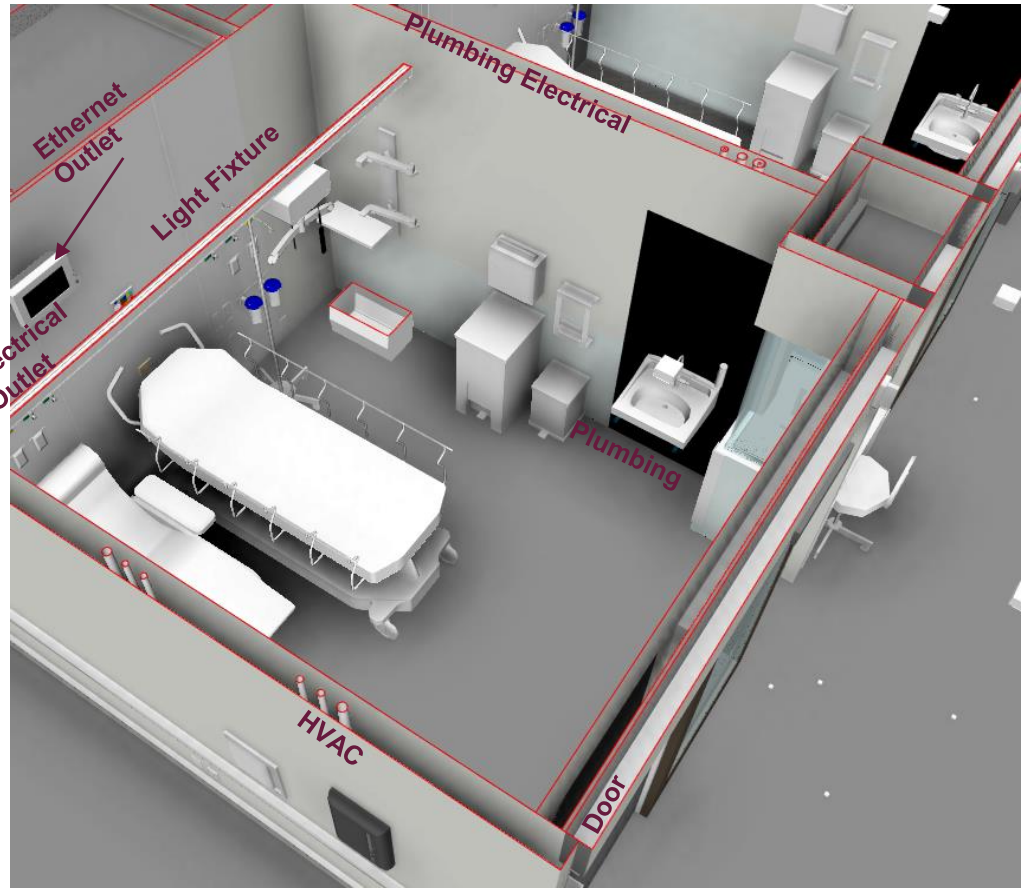
- **W-Rating**

Determines the effectiveness of a firestop system to restrict the flow of water through the assembly.

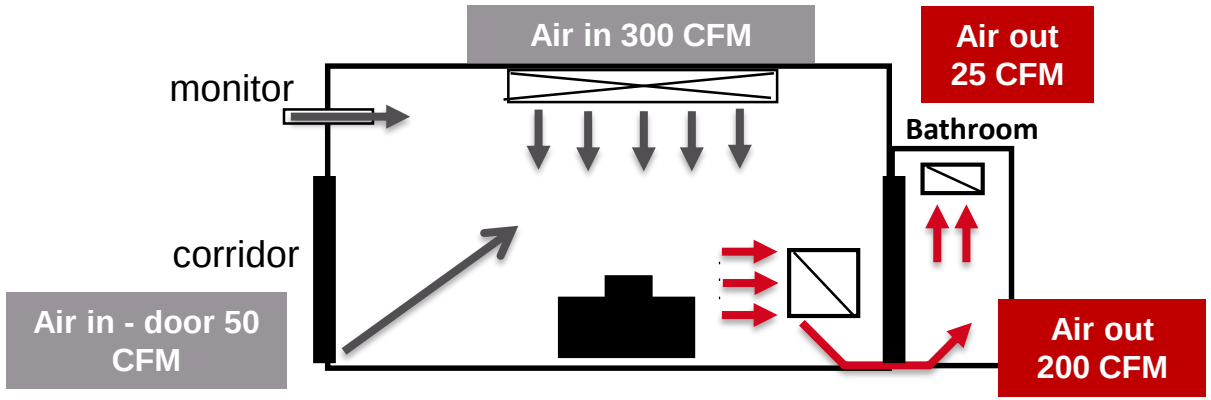
- **L-Rating**

A measurement of the amount of air leakage of tested systems (at ambient and at 400°F) determines the system's ability to restrict the movement of smoke measured in CFM/sq. ft.

AIR FLOW CONTROL CDC GUIDELINES < 125 CFM LEAKAGE NEGATIVE PRESSURE ROOM



Infection isolation = negative pressure room

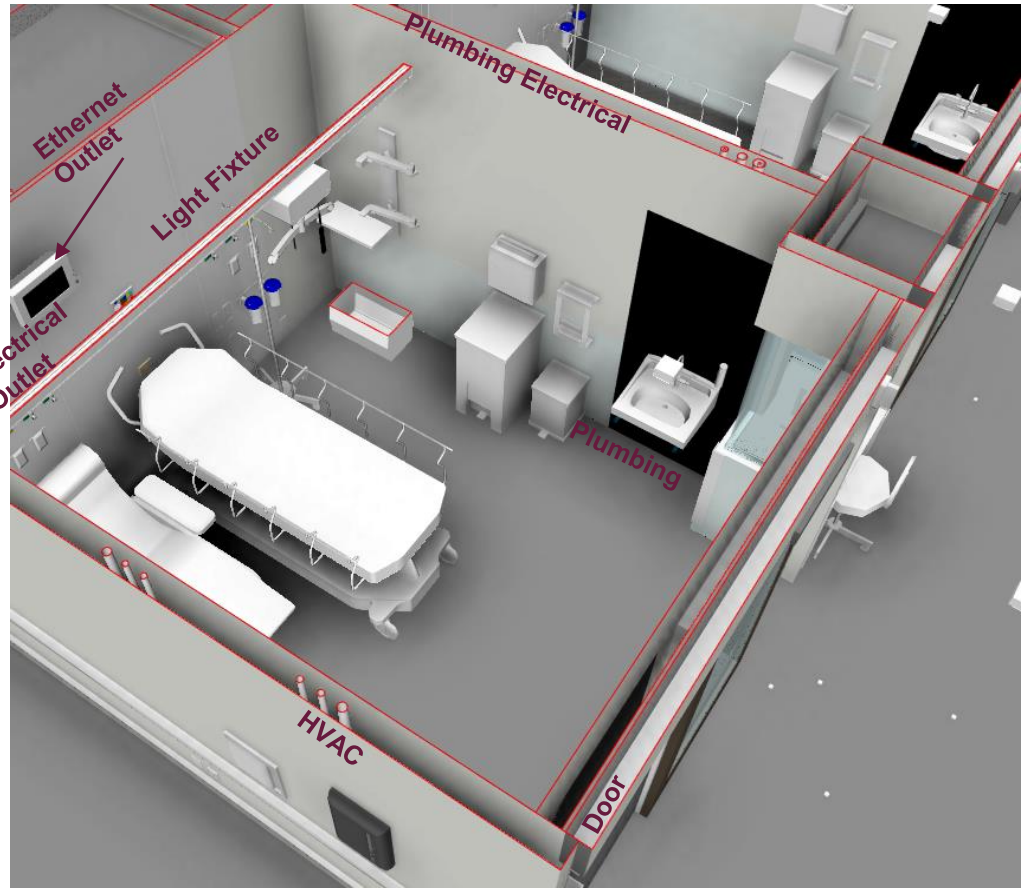


185 sq ft. room

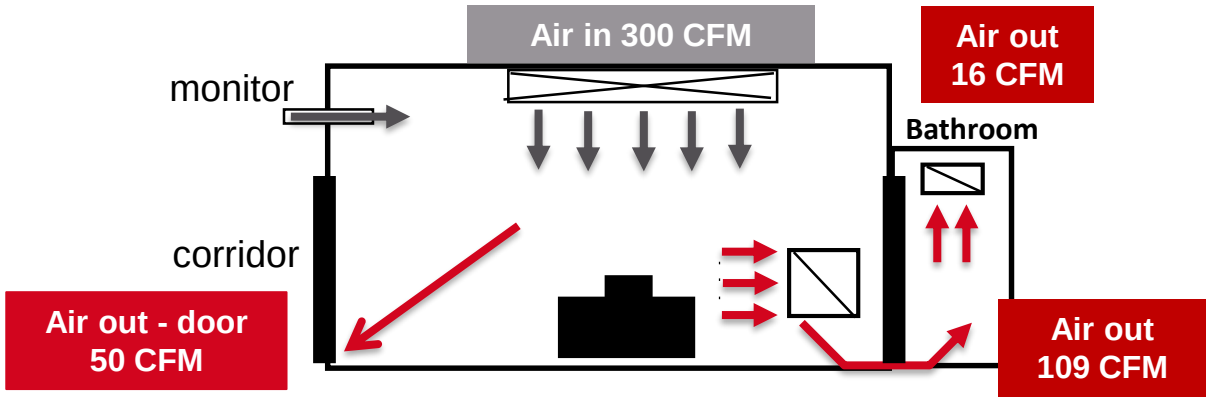
Sustainable airflow control when window and doors are closed – 12 air changes per hour in 185 square foot, 8 foot height ceiling, 1500 cubic foot in ICU rooms

* CDC “Center for disease control”

AIR FLOW CONTROL CDC GUIDELINES < 125 CFM LEAKAGE POSITIVE PRESSURE ROOM



Protective environment = positive pressure room



185 sq ft. room

Sustainable airflow control when window and doors are closed – 12 air changes per hour in 185 square foot, 8 foot height ceiling, 1500 cubic foot in ICU rooms

* CDC “Center for disease control”

ICU ROOM LEAKAGE STUDY - TEST

Materials used:

Ceiling assembly:

- 16 gauge, 1-1/2” metal decking, UL/cUL Classified P900 series

Wall assembly:

- Type X gypsum board, UL/cUL U400 series
- 3 1/2” steel studs spaced 24” on center

Apparatus:

- Blower door

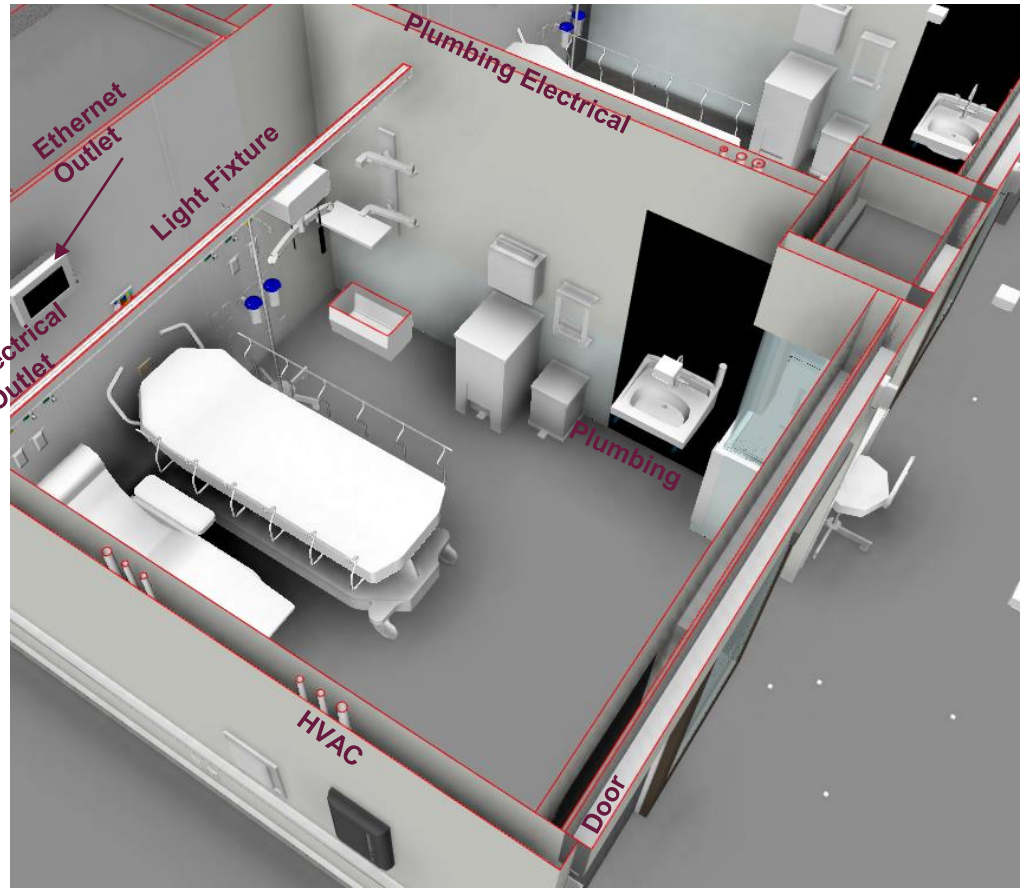
Target air leakage scenario: 125 CFM

https://www.carpenters.org/training_centers/mn/

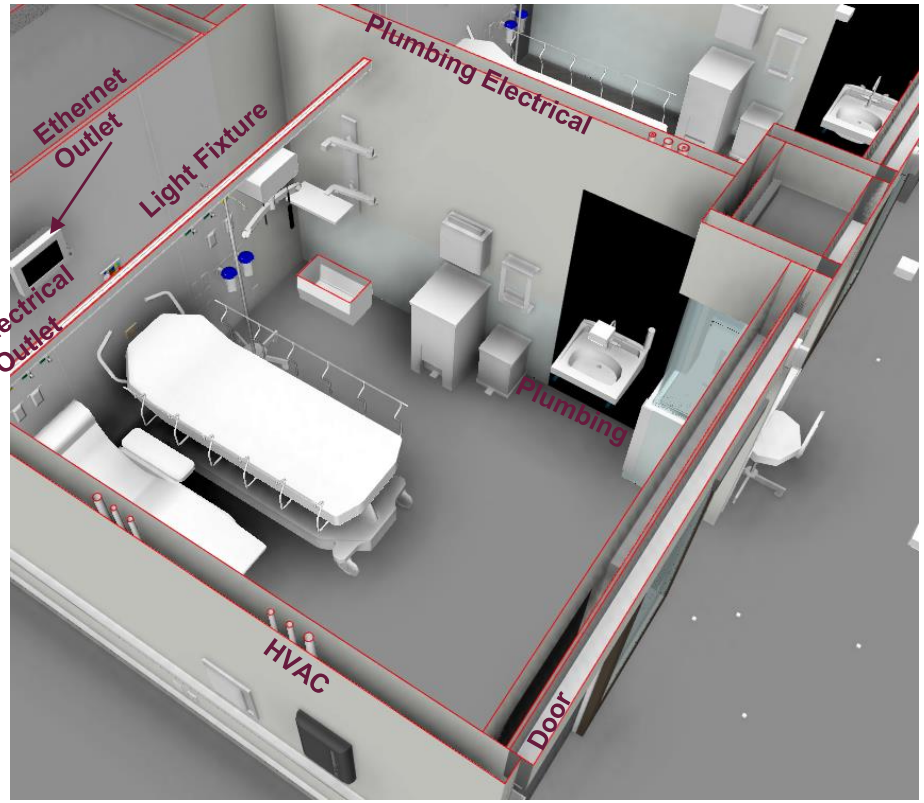
LEAKAGE APPLICATION AREAS

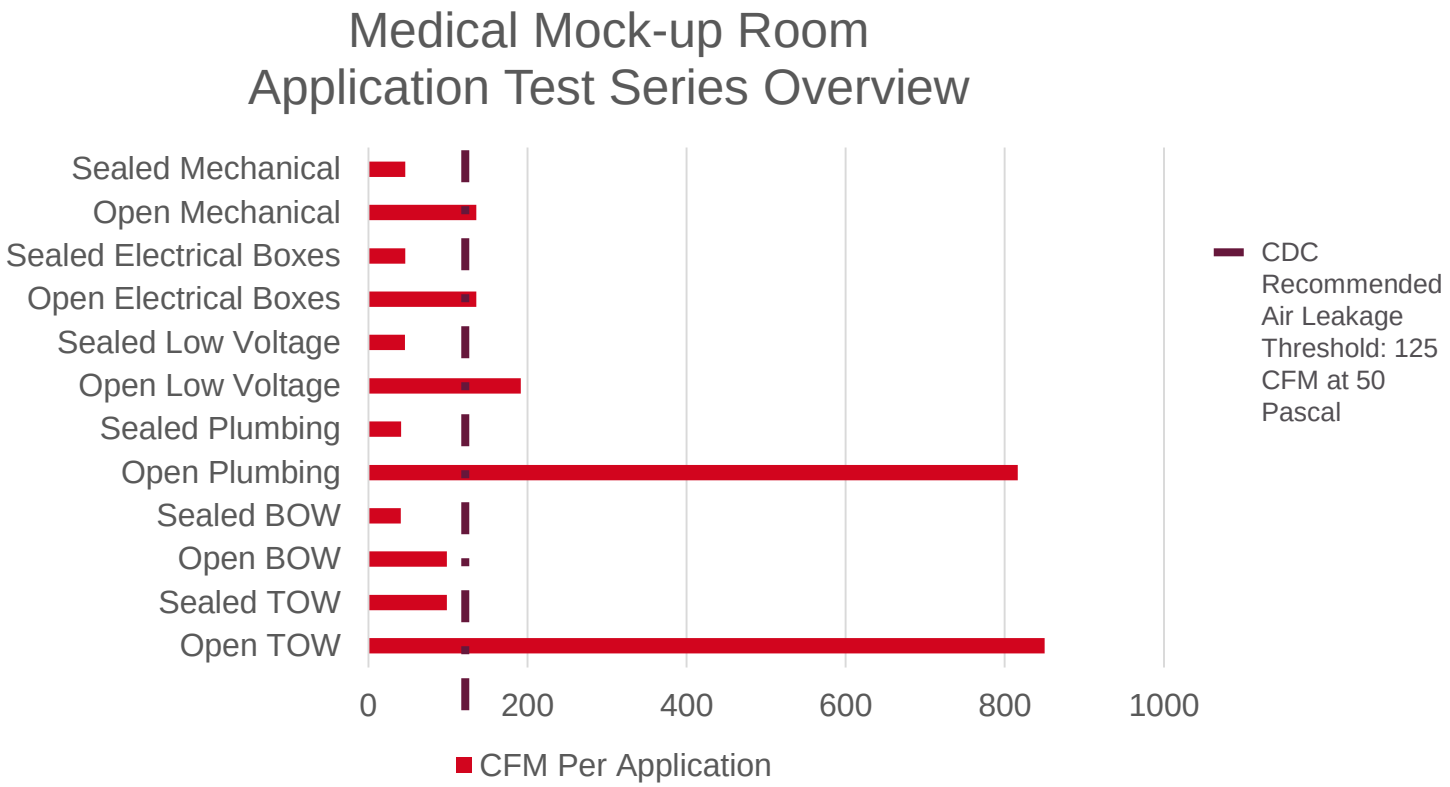
Openings:

- Data cable devices with “L” or leakage ratings
- MEP penetrations
- Medical gasses
- Electrical outlets
- Video connection
- Ceilings – top of wall
- Floor – ½” lift sheet rock from floor



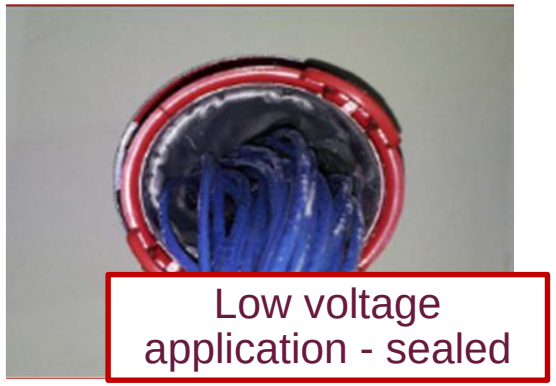
RESULTS - APPLICATION TEST SERIES SUMMARY



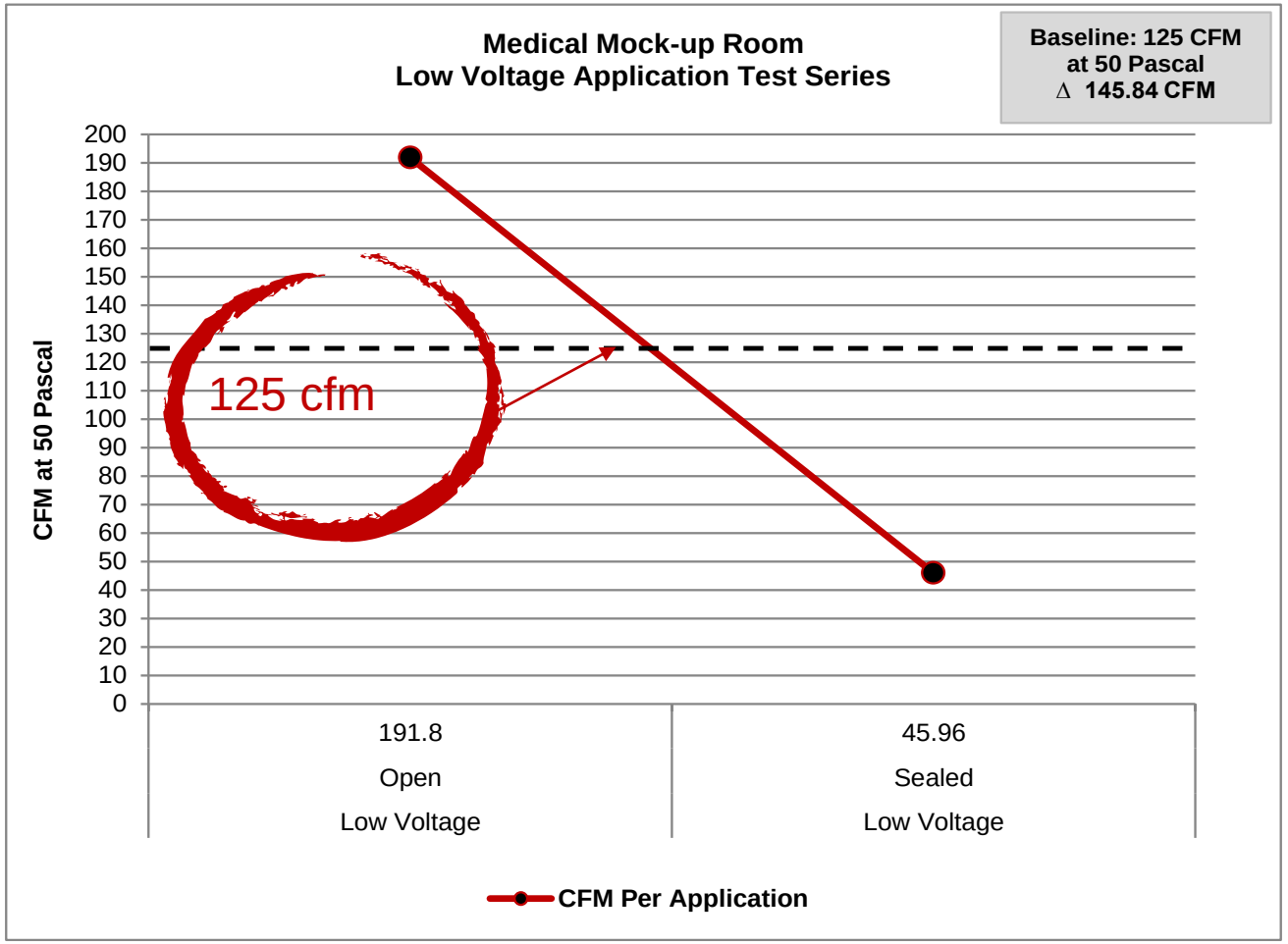


Source: Testing implemented by The Energy Conservatory. Testing completed w/ Duct Blaster fan and micromanometer measuring flows from 10 to 1500 CFM.

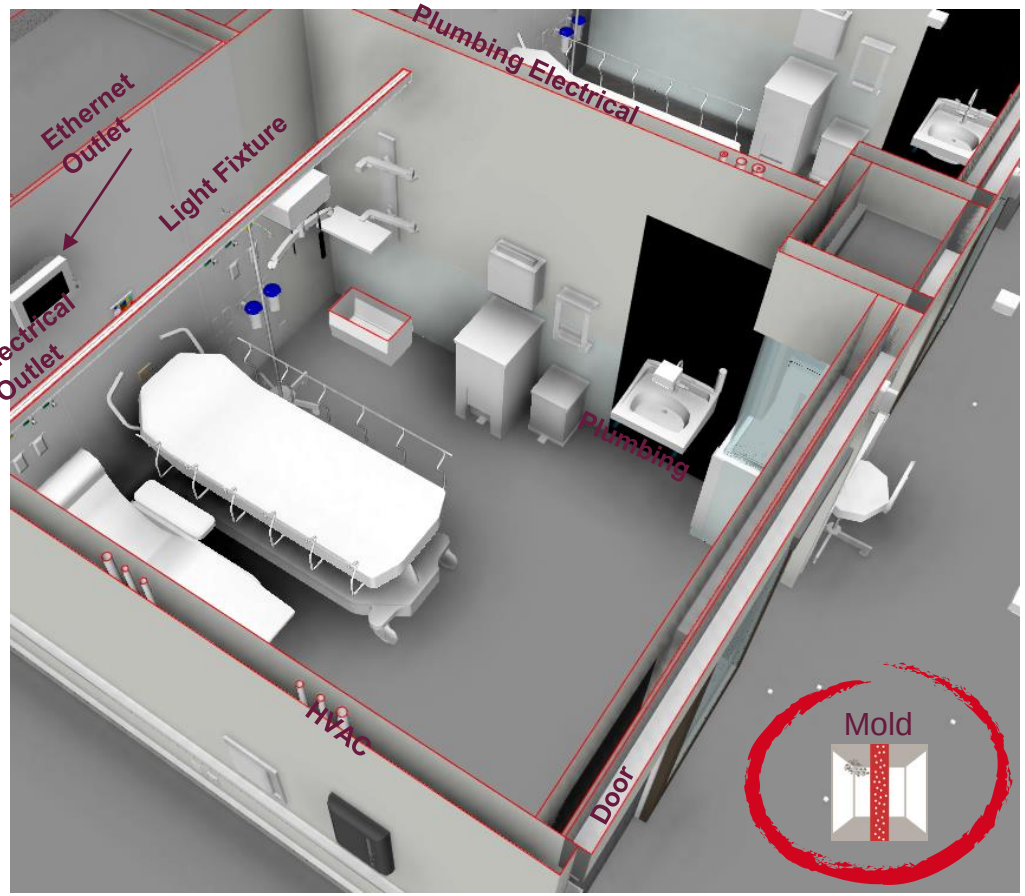
ICU ROOM LEAKAGE STUDY - RESULTS



Low voltage application - sealed



WHAT IS TOTAL BARRIER MANAGEMENT?
BASICS OF FIRESTOP



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ASTM G-21: “STANDARD PRACTICE FOR DETERMINING RESISTANCE OF SYNTHETIC POLYMERIC MATERIALS TO FUNGI"

THE STANDARD

- Airborne infection migration
- Mold mitigation
- Firestop & acoustic sealants
- Rating is 0-4

THE SOLUTION

THE RESULTS

Observed Growth on Specimens Rating	Rating
None	0
Traces of Growth (less than 10%)	1
Light Growth (10-30%)	2*
Medium Growth (30-60%)	3
Heavy Growth (60% to complete coverage	4

https://www.astm.org/standards/G21.htm

SHARED LEARNINGS – TOGETHER WE MAKE A DIFFERENCE

THE NEED – US ARMY CORPS OF ENGINEERS

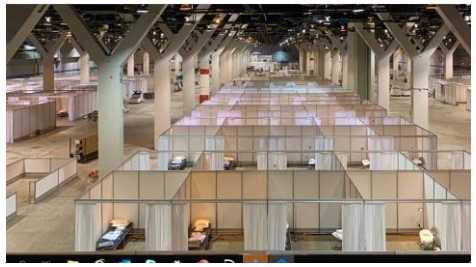
The COVID-19 pandemic has greatly impacted hospital capacity in affected areas and the availability of Covid rooms for patients. Hospitals across the globe where looking for way to expand capacity to prepare for surge situtations with field hospital sites.

Use Case:

To address hospital capacity issues, the US ARMY Corps of Engineers were commissioned to create field hospitals in facilities that altered their intended use like convention centers and hotels. Transitioning these facilities to hospital environments required:

- The creation of negative pressure environments
- Supplies
- Staff and equipment to clean and maintain facility while in use to the stringent medical facility requirements

The industry came together to support the need for creative design, temporary construction installation, basic tools, and crews to clean and maintain these temporary facilities.



Chicago McCormick Place

Hampton Roads Convention

Miami Beach Convention

Washington Convention

THE NEED – RIVERSIDE REGIONAL MEDICAL CENTER

The COVID-19 pandemic has greatly impacted hospital capacity in affected areas and the availability of Personal Protective Equipment (PPE) for healthcare workers. Addtionally, hospitals across the globe are looking for ways to decrease caregiver exposure while administering vital and quality care to patients.

CASE STUDY:
Riverside Regional Medical Center – Newport, VA

Healthcare workers have been on the frontlines of responding to the COVID-19 pandemic, making them particularly vulnerable to contracting the virus. At Riverside Regional Medical Center in Newport News, Virginia, the fight is no different.

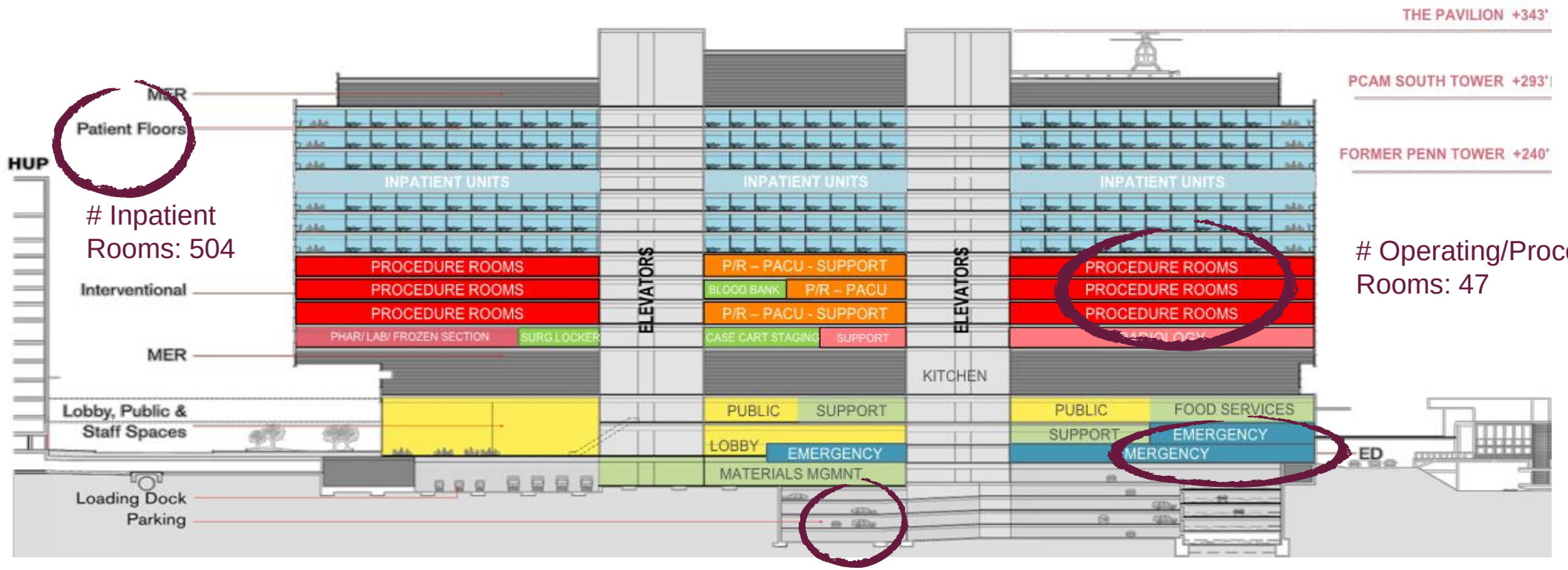
The hospital was confronted with a challenge that many other facilities are faced with: *how healthcare workers can be protected while providing vital and quality care to COVID-19 patients*.

Administrators aimed to produce a solution to build an effective barrier between medical equipment and its patients, and identified the **Hilti CP 653 Firestop Speed Sleeve** as the solution to help reduce the spread of harmful airborne pathogens.

UNIVERSITY PENNSYLVANIA HEALTH SYSTEM
THE PAVILION PROJECT

PROGRAM STACKING

Pavilion Sqft: ~1.5MSF



Inpatient Rooms: 504

Operating/Procedure Rooms: 47

Parking Spaces: ~700

ED Rooms: 61

PRESSURE DEPENDENT ROOMS

Across
ED/Interventional/In-Patient

Positive Pressure: 39

Negative Pressure: 86

TOTAL BARRIER MANAGEMENT EXPERIENCE

University Pennsylvania Health System
The Pavilion Project:

- Single source provider of firestop products used by all contractors.
    - Ensured consistency and expectation of the product installed throughout the building.
- Majority of firestop procured and installed by one contractor.
    - Ensured consistency with installation uniformity.
- Pathways installed above the ceiling allows for added confidence in the design and performance.
    - More true pressure differentials
    - Reduced/Eliminated air seepage
    - Enhanced patient safety

A MESSAGE FROM HILTI CEO – MARTINA MCISAAC

SUMMARY

- Infection control has always been a concern of healthcare industry, but with recent events, is going to be a top requirement in the present and future planning, design, construction and renovation of healthcare facilities

- Firestop total barrier management solutions contribute to reduce airborne infection risk therefore, it becomes a need to properly seal critical applications within healthcare facilities

- Data cabling and low voltage present a unique challenge as these penetrations are constantly changing, therefore, a proper technology that addresses air leakage must be considered

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Q&A

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