Hospital Isolation/Filtration Systems

Email: sales@technovation.org
URL: www.CleanroomSys.com
WHERE ARE AIRBORNE PATHOGENS A CONCERN TO YOU?

- AFB Isolation
- Other Communicable Disease Isolation - e.g. SARS
- ORs
- Laboratories
- Triage
- Radiology

- Neo-Natal
- Burn Wards
- Oncology
- Protection for immune deficient patients - HIV/AIDS
- Pharmacies
Technovation’s Hospital Systems consist of....

• High performance bactericidal* filters - with integral fans for re-circulating air and for creating negative/positive pressure rooms

• Terminal HEPAs for double HEPA filtration – 99.999999% filtration efficiency at 0.3 Um!

• Room annunciators – monitor/control isolation rooms for energy efficiency operation.

* Based on independent laboratory test w/ E. coli and Staph. epidermidis
BIO PLUS® FILTERS MAKE AIRBORNE PATHOGEN CONTROL COST EFFECTIVE

• Bactericidal filtration

• Enables negative/positive pressure without external fan

• Filter has enough power for double HEPA filtration air recirculation and exhaust

• This system exceeds CDC guidelines for AFB isolation

• Results in significant energy savings for isolation rooms

* Based on independent laboratory test w/ E. coli and Staph. epidermidis

MODEL 3001X For other models go to: www.CleanroomSys.com

Technovation 804-744-0604
RX901 Room Annunciator

- Indicates Room Pressure
- Indicates Filter Pressure
- Indicates Status of EEF
- Enables Energy Savings Exhaust Control
- Room pressure alarm – w/ door opening time delay
- Provides output for monitoring room pressure
- ON/OFF control of filter
Portable Integrated Unit

- Technovation also manufactures a portable integrated unit.
- Although not as effective in terms of protection, this system can be useful for emergency isolation of patients.
- This system requires using flex ducts to connect exhaust outside the room.
Award Winning Filtration Technology

• 1997 R&D 100 AWARD WINNER
  This award recognizes the 100 most significant new products and processes. Competition is open to all companies to all categories.

• 1996 MICRO PRODUCT ALL STAR

• 1995 NASA TECHNOLOGY 2005 SBIR AWARD WINNER
Principle of Operation-EEF Technology

Flow enters first high intensity ionizing field.
EEF Technology continued......

Particles and bacteria are charged due to ion flux in this ionizing field - some of the bacteria are killed here.
The charged particles and bacteria are highly efficiently filtered - up to 1000 times lower penetration than conventional filters with the same pressure drop and flow rate.
EEF Technology...continued

Bacteria caught on the filter are subjected to a continuous dose of ionizing radiation and are thus killed*.

* Based on independent laboratory test w/ *E. coli* and *Staph. epidermidis*
Negative Pressure (TB) Isolation Room Schematic

Bathroom exhaust tied into the exhaust ducting. Pre filter should be accessible from room. Main filter housed in module that is removed and accessed above ceiling.
TB/Negative Isolation with Dedicated AC
Negative Isolation w/ VAV/Central AC supply - Integrated
Negative Isolation w/ VAV/ Central AC supply - Separate
Positive Isolation Schematic

Blank supplies or Terminal HEPAs

Make Up Air

Optional Filter Integrated to A/C

Optional Floor A/C

Return
Positive Isolation with Dedicated AC
Positive Isolation w/ VAV / Central AC Supply
Advanced Energy Savings Option for TB Isolation....

• Annunciator senses pressure increase due to in-flux of air conditioning flow through VAV box into room and reacts by opening damper on exhaust to counteract....

• Thus enabling lower exhaust when VAV system reduces or stops conditioned air in to the room.

• This reduces the AC load due leakage from unconditioned space and....

• Results in steadier negative pressure without excessive air exhaust – resulting in very significant energy savings.
Advanced Energy Savings Option for TB Isolation....
AFB ISOLATION THAT GREATLY REDUCES RISK AND PAYS FOR ITSELF

- Filter system rated at 99.999999+% DoP-
  Provides virtually particle free air - the room performs as a Cleanroom.
- Bactericidal* – low bioburden in the room.
- Maintains proper negative pressure - min -ve pressure of -0.02”WC.
- Significantly reduces operating costs.

* Based on independent laboratory test w/ E. coli and Staph. epidermidis
### How Much Filtration Efficiency is Needed?

<table>
<thead>
<tr>
<th># of particles/ft³ entering the filter</th>
<th># of particles penetrating single HEPA Filtration-99.99%</th>
<th># of particles penetrating double HEPA Filtration – 99.999999%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 million</td>
<td>100 per ft³</td>
<td>~0 per ft³</td>
</tr>
<tr>
<td>10 million</td>
<td>1,000 per ft³</td>
<td>~0 per ft³</td>
</tr>
</tbody>
</table>

Point of reference: Indoor air has 500,000-1MM 0.3 Um particles/ft³

Outdoor air in urban areas can be much higher
Performance of BIO PLUS® EEF HEPA with Terminal HEPA filters

Due to low flow restriction, BIO PLUS® EEF filters can be used with terminal ceiling HEPA filters (Double HEPA filtration) to obtain virtually particle free air.
HIGHER REMOVAL RATE - EEF SYSTEMS vs. VENTILATION

![Bar chart comparing removal rates for Standard, Straight Vent, and BioPlus EEF systems at 2 ACH, 6 ACH, and BioPlus EEF.]
Comparison to Ventilation

...a cleaner environment

<table>
<thead>
<tr>
<th>Feature</th>
<th>Ventilation</th>
<th>EEF</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACH*</td>
<td>12 (CDC)-24</td>
<td>64</td>
</tr>
<tr>
<td>0.3 Um Filtration Efficiency</td>
<td>50% w/ 95% ASHRAE</td>
<td>99.999999+% DOP</td>
</tr>
<tr>
<td>Est. Particle Conc #/ft3</td>
<td>300,000-1 MM</td>
<td>10,000</td>
</tr>
</tbody>
</table>

*Based on 10x10x8 room size
Comparison to Ventilation - Energy Savings

- Room size - 100 ft² comparing Ventilation @ 24 ach to **BIO PLUS® EEF** system @ 64 ach.
- Cost Savings up to $1,821 per year per room - PLUS THE BENEFITS OF HIGHER PROTECTION!

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Ventilation</th>
<th><strong>BIO PLUS® EEF</strong></th>
<th><strong>BIO PLUS®</strong> w/ Advanced Energy Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makeup air</td>
<td>320 scfm</td>
<td>200 scfm</td>
<td>Av 100 scfm</td>
</tr>
<tr>
<td>KW</td>
<td>4</td>
<td>2.5</td>
<td>1.25</td>
</tr>
<tr>
<td>Cost @ 7.5c/hr</td>
<td>$2,649</td>
<td>$1,655</td>
<td>$827</td>
</tr>
</tbody>
</table>


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OR APPLICATIONS - INFECTIONS AFTER SURGERY ARE VERY COSTLY

• How much does it cost you for just one patient who develops an infection after surgery?

• Current U.S. guidelines call for 15 ACH whereas in some European countries Class 100 - 10,000 Clean Rooms are the standard with very few infections.

• How much are your suites costing you?
Positive Pressure ORs/Cleanrooms

Blank supplies or Terminal HEPAs

Optional Filter Integrated to A/C

Return
IMMUNOCOMPROMISED PATIENTS CREATE UNIQUE CHALLENGES

Rooms and Wings that house ...

- Oncology
- Neo - Natal
- Burn Wards
- HIV / AIDS patients

Greatly benefit from an environment where airborne pathogens have been removed. This can be done very cost effectively with EEF Air Cleaning Equipment.
LABORATORIES NECESSITATE DIVERSE SOLUTIONS

- Work benches or clean zones are a pre-requisite.
- Laboratory testing requires Clean Air so analysis has little to no cross contamination possibility.
- Technovation laminar flow benches provide Class 0.1/1 Clean Room environment.
- Biotech companies are using our Clean Rooms due to unparalleled cost effectiveness and efficiencies.
DOES THIS REALLY APPLY?

“Go to a hospital if you want to get SICK.”

Quite frankly, this saying is true in too many cases but it doesn’t have to apply to your facility. Technovation can provide cost effective, efficient solutions for Infection Control.