

# Electronic Enclosure Air Filter

## Extending the Cleaning Cycle Interval and Reducing Preventative Maintenance on Slot Machines

Electronic equipment owners and manufacturers are recognizing the need for efficient, economical air filtration to improve equipment performance and reliability. In particular, modern video gaming and vending machines utilize powerful computers, video devices and other critical electronic components that generate significant heat. Buildup of debris from airborne particles may cause premature electronic component failures, increased maintenance cost, or a poor aesthetic appearance to the end consumer. Therefore, adequate air filtration or constant cleaning is required to ensure reliable performance. However, many of these machines do not have adequate air filtration.

### Costs Associated with Maintaining a Cleaner Slot Machine

Each slot manufacturer and casino has its own preventative maintenance schedule for its slot machines, which varies from two to six months. The main reason for the scheduled preventative maintenance is to protect equipment from the damaging effects of dirt, dust, smoke and carpet fibers. These contaminants may collect on critical electronic components, possibly shortening the life or reducing the reliability of the component and, in turn, resulting in excessive maintenance costs.

Many businesses that depend on these machines for revenue are under pressure to reduce operating costs; which may result in reduced preventative maintenance of these machines. These businesses and other electronic equipment owners are recognizing the need for an efficient, economical air filter to improve equipment performance and reliability. The problem with certain kinds of conventional filters is that they may have low particle capture efficiency, high initial airflow resistance, or load quickly with particles causing the airflow to decrease too much over time. To maintain the required airflow, the filters may require frequent replacement, and/or the equipment may require frequent cleaning/maintenance, depending upon the application conditions.

### 3M Solution

3M™ High Air Flow Electrostatic Filters (System Model 3600B) have been specially designed to help reduce the amount of certain airborne contaminants such as smoke, dust, dirt, debris and carpet fibers from entering air intakes on devices such as slot machines, vending machines, arcade games, ATMs, kiosks, and computers. A high permanent electrostatic charge on the 3M filter media is the key to the filter performance. The innovative filter design provides the basis for excellent particle capture, or efficiency, while maintaining high airflow. This high charge also helps prevent shedding of collected dirt during use and filter change-out. A lower pressure drop filter may allow the design of an airflow system with a higher flow rate or a reduced blower capacity, the latter resulting in quieter operation.



The 3M™ High Air Flow Electrostatic Filter System can be installed over most electronic enclosures' ventilation inlets and filter the air to provide cleaner air to the slot machine. The filter is designed to last up to three months and may have the ability to reduce preventative maintenance (PM) cycles on each slot machine, decrease downtime, and keep the glass looking cleaner, and in turn, saving the company time and money.

### Field Tests



#### Filter Condition Three Weeks into Field Test

Filter assembly shown in equipment to demonstrate cleanliness of machine.

A field trial was conducted at two Las Vegas casinos using Bally slot machines. The 20-week field test was performed to determine the value of the 3M High Air Flow Electrostatic Filters on slot machines during normal use. A slot technician for each casino cleaned two slot machines, a filter system was placed on one slot machine and one slot machine was used as a control.

This 20-week test was aligned to the casino's normal routine game preventative maintenance (PM) schedule. After the 20 week trial period was concluded, machines with the 3M filters were clean and the glass had no visible debris. The filter on these slot machines had noticeable debris buildup. There was no need for preventative maintenance on these machines. In contrast, the machines without the 3M High Air Flow Electrostatic Filters (System Model 3600B) had visible debris inside the machine, as well as on the glass. These slot machines were now ready for regular preventative maintenance. Spike Fullard, Director for Field Service, Bally Technologies, stated that by utilizing the 3M filter, they can double or even triple their preventative maintenance time interval.

## The 3M™ High Air Flow Electrostatic Filter System (Model 3600B) includes:

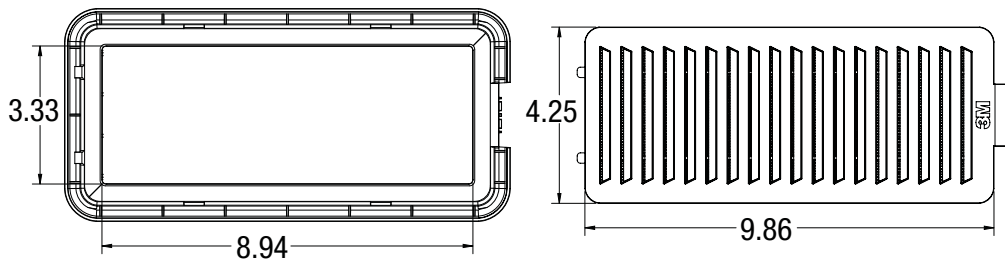
- Mounting Bracket
- 3M™ 4462 double sided foam tape
- Louvered Filter Cover
- HAF-E filter media



### Filter Design

The 3M filter was designed for electronic enclosures that do not have a filter at the air intake vent. 3M engineers had the following design criteria selected when designing and testing a new filter:

1. The filter had to accommodate a wide range inlet sizes.
2. The filter had to have very low pressure drop as most of the machines depend on an unrestricted air intake for proper ventilation.
3. The filter had to perform well on large particles including dust, carpet fibers and lint as these are the most harmful particles to be captured on the inside of an enclosure.
4. The filter had to reduce the amount of smoke particles inside the enclosure as many businesses such as casinos have high levels of smoke in the air which can stick to particles and machine components.
5. The filter had to be easy to install and filter changes needed to be made fast to minimize maintenance time.
6. The bracket and cover needed to be made of high quality materials that were textured to look aesthetically pleasing when installed on the machine.



### Mounting Bracket

The filter system mounting bracket is designed to fit most video game machines' ventilation inlets. The bracket is designed to fit over an opening that is approximately 10" x 5" or less including standard 4" x 4" square openings. The mounting bracket is molded from a very durable high impact polystyrene plastic that is textured for a high quality appearance. The bracket is permanently mounted to the enclosure with 3M tape that is included with the filter system. The foam double sided tape was specifically chosen to stick to a wide variety of surfaces including textured metals, wood and plastics.

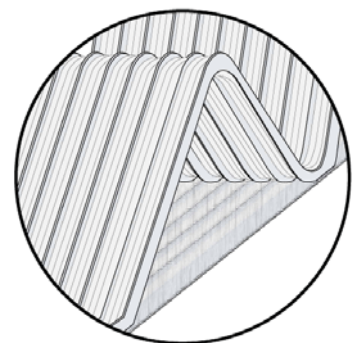


### Filter Cover

The filter cover is a louvered textured plastic cover that holds the media and snaps into the bracket for easy installation and filter changes. As often happens with a filter, the surrounding surfaces buildup layers of dirt and fibers. The filter replacement allows the entire louvered assembly to be changed, making filter maintenance very fast and allows a new louvered surface to be placed on the machine and maintaining a new appearance.

### Filter Media

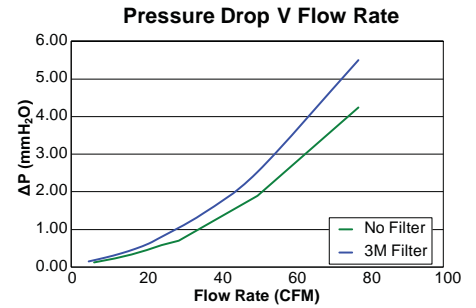
3M™ High Air Flow Electrostatic Filters utilize a unique combination of 3M High Air Flow (HAF) and a low density media containing a very high electrostatic charge. 3M High Air Flow is a macrostructured, electrostatically charged media containing microstructured surface features that enhance the effective surface area and charge. The innovative design results in a filter with airflow resistance - low pressure drop. The unique integration of these distinct media types results in a filter containing the positive attributes of each: high particle capture efficiency, lower pressure drop than the standard low density media, and higher loading than standard HAF. The High Air Flow Electrostatic Filter may be ideal for applications where space is limited, and high initial efficiency, low pressure drop and high loading are critical.



## Filter Performance

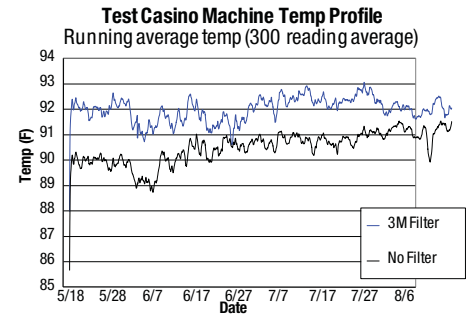
The 3M™ High Air Flow Electrostatic Filter is designed to have low pressure drop while maintaining a high level of particle capture efficiency. The filters were tested in an independent test laboratory to determine the pressure drop, dust holding capacity, and efficiency.

The graph to the right shows the pressure drop of a 3M filter compared to no filter in the 3M filter housing. At low flow rates, typically found in video gaming machines, there is a minimal pressure drop difference between having a 3M filter vs. no filter.



## Machine Temperatures

The ventilation of a video gaming machine is designed for one main purpose: to keep the critical electronic components cool. The chart to the right shows the temperature of a gaming machine as it is originally designed, and another that had a 3M filter installed. The minimal restriction of the 3M air filter increases the temperature only a few degrees based on extensive field tests in real world conditions.



## Filter Replacement

With a 3M high efficiency filter protecting the air intake ducts from certain airborne contaminants, the need to perform daily, weekly, and/or monthly cleaning of a device interior may be reduced. Filter change-out can be performed in less than 30 seconds with no special tools and typically does not require taking the equipment out-of-service resulting in maximum uptime of the OEM device.

## Regulatory

- The 3M™ High Air Flow Electrostatic Filter has a UL 900, Class 2 flammability rating (US)
- RoHS Directive compliant. The product does not contain any of the substances in excess of the maximum concentration values in EU Directive 2002/95/EC, as amended by Commission Decision 2005/618/EC.
- Maximum operating temperature: 158°F (70°C)



After 3 Months of Use



# 3M™ High Air Flow Electrostatic Filter Specifications

## Specifications

Filter Media Material	Hydrophobic Polypropylene
Filter Housing Material	High Impact Polystyrene (HIPS)
Filtration Surface Area	0.2 m <sup>2</sup> (2.15 ft)
Outside Dimensions (W x H x D)	271 x 130 x 20 mm 10.66 x 5.13 x 0.77 inches
Max Operating Temperature	158°F (70°C)
Minimum Efficiency Rating Value (MERV)	MERV 6 @ 75 cfm
Recommended Change-out Time	3 months*
RoHS Directive Compliant	Yes
Independent Laboratory Testing	Tested by an independent laboratory per applicable sections of ASHRAE 52.2

The table below indicates the approximate size of some common contaminants and particles for reference only. The size of particles are often described in microns, a metric unit of measure where one micron is one-millionth of a meter.

Contaminant Type	Typical Particle Size Range
Tobacco Smoke	0.01 - 4 microns
Fiber Lint	5 microns
Carpet Textile Fibers	10 - 1000 microns
Human Hair	40 - 300 microns
Dust Mites	100 - 300 microns

Note: Particle sizes may vary and dimensions listed above are approximate and for reference only.

## Ordering Information

Item	Ordering Number
3600B Filter and Bracket Assembly	70020266048
3600 Filter Assembly	70020266063



Filter and bracket assembly



Bracket adhesive mounting strips



Filter and bracket assembly latch



Filter assembly



### 3M Purification Inc.

400 Research Parkway  
Meriden, CT 06450  
U.S.A.

1-800-243-6894

dmbotts@mmm.com

www.3mpurification.com

Please recycle. Printed in USA.

3M is a trademark of 3M Company.

© 2012 3M Company. All rights reserved.

70-0202-8956-0 REV 0312

#### Important Notice

Specifications are subject to change without notice. These Products are warranted to meet their published specifications from the date of shipment and for the period stated in the specification. 3M Purification Inc. MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Since a variety of factors can affect the use and performance of a 3M Purification Inc. product in a particular application, some of which are uniquely within the user's knowledge and control, user is responsible for determining whether or not the product is fit for a particular purpose and suitable for user's method of application.

#### Limited Warranty

3M Purification Inc. warrants it this product to be free from defects in material and workmanship during normal use for a period of one (1) year from the date of shipment from the factory. If the Product(s) is (are) defective within this warranty period, your exclusive remedy and 3M Purification Inc.'s sold obligations shall be, at 3M Purification Inc.'s option, to replace or repair the Product(s) or refund the original purchase price of the Product(s). This warranty does not apply to failures that result from abuse, misuse, alternation or damage not caused by 3M Purification Inc. or failure to properly follow installation and use instructions. This warranty gives you specific legal rights and you may have other rights which vary from state to state, or country to country.

#### Limitation of Liability

3M Purification Inc. will not be liable for any loss or damage arising from the use of the Product(s), whether direct, indirect, special, incidental, or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you.