

**Filtrex<sup>®</sup>**

**A Smoke Detector for  
Difficult Environments**

# Filtrex®

## A Smoke Detector for Difficult Environments

### Contents

Section 1	Product Overview .....	2
Section 2	Operating Principles.....	2
Section 3	Filtrex® Proves Itself .....	3
Section 4	Applications .....	3
Section 5	Application and Placement Considerations.....	4
Section 6	Installation Considerations.....	5
Section 7	Specifications.....	5

### Benefits

Filtrex goes to the worst places. Made for some of the most difficult interior environments on earth, it holds its own against dust, insects and will even withstand occasional water spray. This specially designed, patented smoke detector filters airborne particulate so it can concentrate on sensing smoke.

Filtrex is fast. Its early response time provides early detection — well before slower-responding thermal detectors — thereby minimizing property loss.

It doesn't fool with fire. Filtrex virtually eliminates false alarms — minimizing business interruption.

Filtrex installs easily into existing analog-intelligent systems.

**Section 1  
Product Overview**

**The first difficult environment smoke detector**

It's well known that smoke detectors just don't work in certain places. Dirty, dusty places like paper mills. Lumber mills. Cotton and textile mills. Dry chemical processing plants. Horse stables and other climate controlled animal holding areas.

Until now, it was next to impossible to achieve true early warning of smoke in these dusty, dirty environments. No smoke detector could stand up to the punishment of dust. Anyone bold enough to try a photoelectric smoke detector in such a place would report the same experience — frequent false alarms or frequent maintenance.

Until now, specifiers could only choose between thermal, flame detectors, thermal wire or beam detectors. Some of these alternatives, such as flame detectors, could be effective, but are expensive and maintenance-intensive. Others, such as thermal detectors, could be slow to react — and in the fire detection business, too slow can be too late.

Although these technologies can save lives, they may not respond early enough to prevent property damage. And

prolonged extinguishing by water sprinklers or misters can actually increase property damage.

Filtrex entirely changes this picture. Using a high-density filter and air intake system, Filtrex removes airborne matter before it reaches the smoke sensor. Dust, insects, water spray — Filtrex shuts them all out.

And that frees the sensor to do its job: sense smoke.

The results of this technology?

- Demonstrably superior performance.
- True early warning.
- Rapid response without false alarms.
- Straightforward installation into existing systems.
- Low maintenance.

Filtrex is also fully supervised. Internal circuitry can detect a clogged filter or fan failure.

While Filtrex is ideal for some of the most dusty and dirty places on earth, it is not intended for exterior use, nor is it recommended for extremely hot, humid, corrosive, hazardous, intrinsically safe or explosive environments.

**Section 2  
Operating Principles**

Filtrex removes foreign particulate — such as dust and water spray — while allowing smoke to arrive at the sensor.

Photoelectric smoke detectors provide advanced warning of impending fire without requiring heat to alarm.

However, because these smoke detectors work on a light-scattering principle, any particulate that enters the sensing chamber can lead the sensor to believe it is detecting smoke. The result: a possible false alarm.

Filtrex is a specially-enclosed intelligent photoelectric smoke detector that provides the ability to operate normally in environments that would otherwise cause false alarms. The sealed enclosure contains two high-density air filters that capture dust and water spray while allowing smoke to pass through to the sensor. A small fan draws-in filtered air samples, cycled on and off to increase its life and reduce current draw.

Filtrex draws air (1.) through two high-density filters. One filter is field-cleanable; the other is permanent to protect the sensing chamber. A fan, cycled to increase life expectancy and reduce current draw, pulls the air through the fine filters and past the sensing chamber (2). Air is then exhausted (3.) through the chamber and back out the cover. A standard photo sensor is used as the sensing device. Gaskets provide additional dust protection.

**Cycled Sampling**

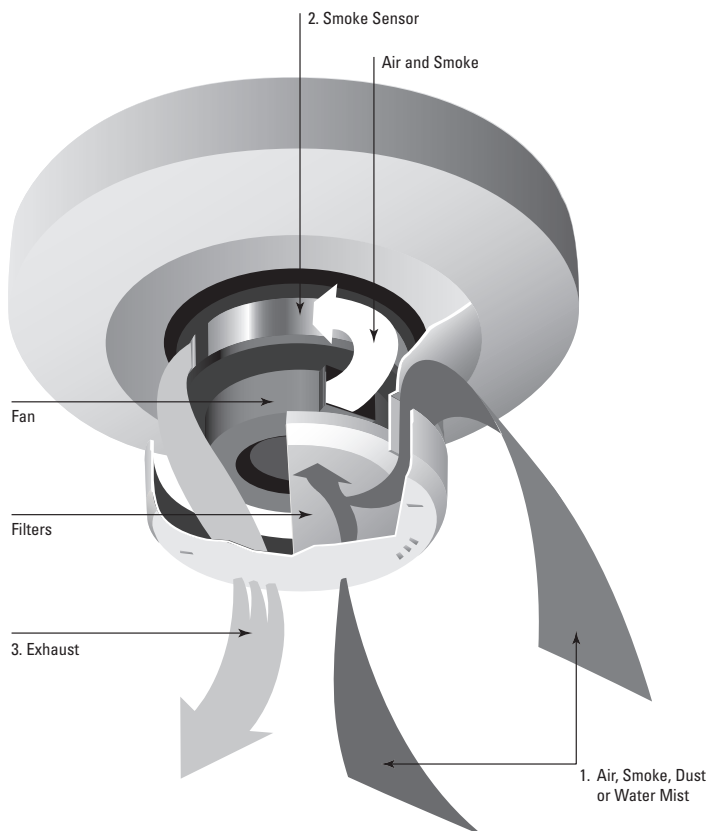
Air is sampled every 35 seconds for five seconds. Air flow is checked every four hours for 15 seconds. Two high density filters remove particulate.

**Continuous Protection**

Smoke is detectable while water spray or dust is present.

**Full Supervision**

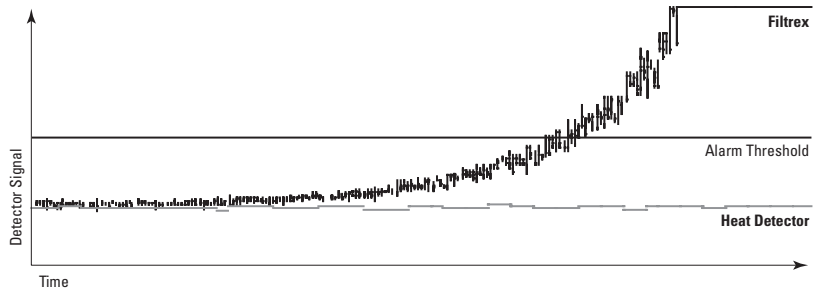
If a filter clogs, the panel is alerted and the device is taken off-line. Power-up is automatic when the dirty filter is replaced.



**Section 3**  
**Filtrex®**  
**Proves Itself**

**Smoldering Fire Test**

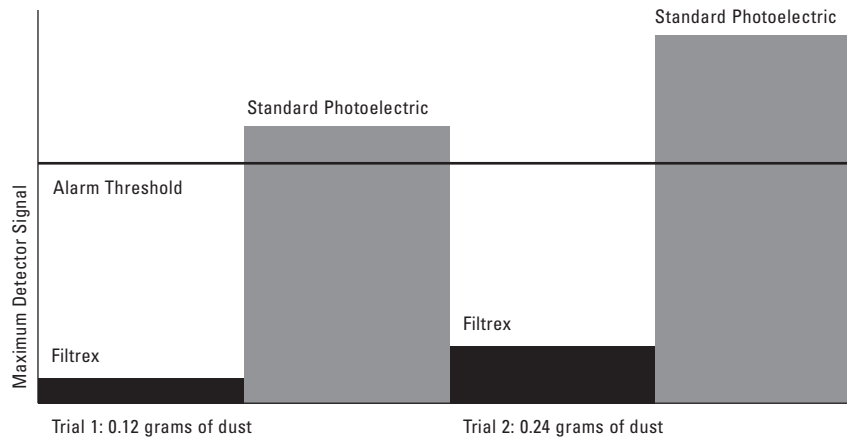
In this test, a UL smoldering fire (see UL standard 268 for more details about this fire) was performed in which 10 small pieces of wood were placed on a hot plate. At time zero the hot plate was at room temperature. It was slowly ramped to a temperature of around 500°F. Smoke began generating around the 20 minute mark. Filtrex, in this test, alarmed about 20 minutes after the first smoke was generated. This particular fire would not generate enough heat to alarm a heat detector until a flame-over condition occurred and sufficient heat was generated. As you can see here, Filtrex may provide an early warning.



**Filtrex responds to smoldering fires while heat detectors may not.**

**Airborne Dust Test**

This graph shows the results of two separate trials testing the performance of a standard photoelectric smoke detector against Filtrex in a dusty environment. In each test, the signals from the detectors are monitored while they are exposed to a predetermined amount of dust. In each trial, the standard photoelectric smoke detector reaches the alarm threshold, while Filtrex stays safely below.



**Section 4**  
**Applications**

Note to specifiers: check that the specified product temperature and humidity conditions are met.

**Potential Applications**

- Paper and lumber mills
- Cotton and textile mills
- Dry chemical processing plants
- Duct Installations
- Food processing plants
- Packaging areas (corrugated dust)
- Laundry rooms
- Wash-down and hose-down areas
- Animal holding areas (zoos, stables, barns)
- Motion picture studios
- Subway tunnels

**Applications to Avoid**

- Explosive conditions
- Out-of-range temperature and humidity
- Hazardous environments
- Outdoor or marine installations
- Unheated animal barns

**Section 5****Application and Placement Considerations**

During our extensive field site testing, we gained valuable experience on how to best apply the product. Performance feedback indicates that Filtrex provides superior detection in difficult environments, as there have not been any reported false alarms. Here are some factors to consider when evaluating potential applications.

**Temperature Considerations**

Importantly, Filtrex is not an outdoor product. Observe temperature range when specifying product. The UL specified temperature range is 32 degrees to 120 degrees F (0 degrees to 49 degrees C) and relative humidity is 10%–93% noncondensing.

**Water Spray**

Filtrex has also been designed to withstand periodic contact with water spray directed at the housing. Filtrex filters have a special coating that prevents water from passing through or clogging the filter; water beads on the filter and falls off. A potential application could be a wash-down area where there is periodic over-spray that contacts the detector. There should be adequate time between water contact for the unit to dry. Filtrex has not been designed for continuous water contact nor has it been designed to withstand a forceful direct spray. Also, damage may occur if water is allowed to enter from the back of the base where the power and communication wires enter.

**Particle size and filter issues**

The two high-density filters that remove airborne particulate have a pore size of 32 microns. This opening size has been carefully chosen through extensive testing to balance between keeping dirt particles out while still allowing adequate smoke entry. So, depending on the particular environment, there is a possibility that a small amount of particles will enter the chamber. In this case, you may experience a low level detector response (analog output from Filtrex shows an increase in signal). But, this increase tends to be well below alarm threshold and, compared to an open area smoke detector in the same environment, is drastically lower. Tests also show that over time, the particles do not tend to build-up, but rather are exhausted from the chamber. With the majority of industrial conditions,

Although Filtrex is designed to withstand very dirty environments, it does have some limitations.

Although Filtrex is designed to withstand very dirty environments, it does have some limitations.

there should not be an issue, but consideration should be given to the expected particle size distribution of the dust or dirt found in a given environment.

The rate of filter clogging on Filtrex will vary for each individual application. Factors include density, size and structure (fiber, spherical, etc.) of the particles, duration and frequency of high dust conditions, and "stickiness" of the particles (will they adhere to the filter or lay on the surface). We have seen conditions where the filter could last for several years and conditions where filter life was much shorter.\* Again, each application will be different and thus, will have varying filter life. If the filter does clog, simply remove the cover/filter assembly and replace with a new one (replacement cover/filters are available). Note: As airflow is reduced due to clogging, Filtrex cuts power and causes a trouble signal at the fire alarm control panel.

*\*Interestingly, we found that in some especially tough areas, changing the filter even on a monthly basis is not too high a price for some customers to pay for detection they have never been able to get before.*

**Placement**

For placement and spacing purposes, Filtrex is a spot type smoke detector. NFPA 72 guidelines for open area smoke detectors should be observed. A few other common sense rules will allow the product to work as specified:

- Do not install Filtrex at steam outlets. Steam particles are very small and may pass through the filters, causing false alarms.
- To extend filter life, do not install Filtrex in the direct path of extreme amounts of dust. Although false alarms should not be a problem, carefully placing units can add substantial life to filters.

**After a fire**

Filters should always be replaced after any fire condition to ensure that proper airflow is maintained. Smoke from actual fires will have a tendency to stick to the filters and reduce airflow.

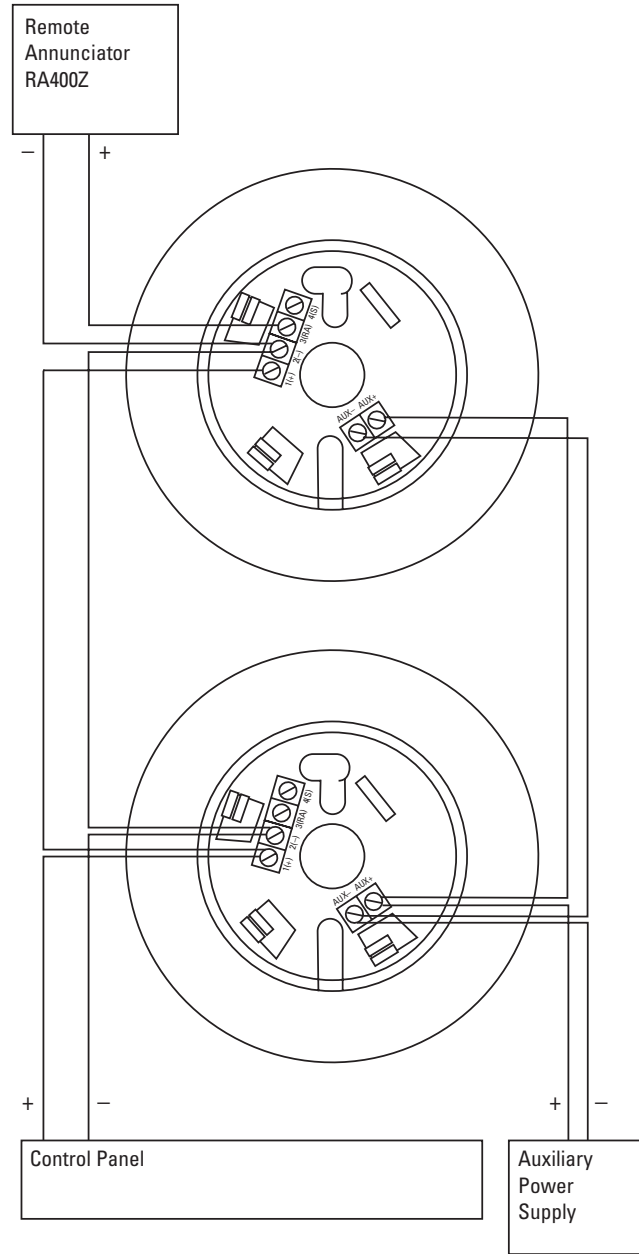
**Applications Support**

Call your fire system supplier or System Sensor with any questions.

Section 6

**Installation Considerations**

Installation of the Filtrex system is essentially the same as installing standard intelligent photoelectric smoke detectors, although the mounting base is modified for additional electrical connections.



Section 7

**Specifications**

**Filtrex Smoke Detector for Difficult Environments**

<b>Size</b>	3.5 in. (8.9 cm) H x 4.0 in. (10.2 cm) dia.
<b>Weight</b>	7.3 oz. (207 g)
<b>Detector Input Voltage</b>	15 – 32 VDC
<b>Detector Current Draw</b>	250 $\mu$ A max. @ 24 VDC (without communication) 360 $\mu$ A max. @ 24 VDC (one communication every 5 sec. with LED enabled)
<b>Auxiliary Power Supply Input Voltage</b>	15 – 30 VDC (filtered)
<b>Auxiliary Power Supply Current Draw</b>	Average current: 27 mA max. Peak current: 123 mA max.
<b>Operating Temperature Range</b>	0° to 49°C (32° to 120°F)
<b>Relative Humidity</b>	10% – 93% noncondensing
<b>Rated Air Velocity</b>	0 – 4000 ft./min. (0 – 20.3 m/s)

Distribuição: Alarmes Tucano Ltda  
R. Des. Antônio de Paula, 3577 - Curitiba - Pr  
Fone/fax: (41) 326-2867 - Cep: 81720-280  
tucano@tucanobrasil.com.br  
www.tucanobrasil.com.br

