



Air Filtration Application

About electrostatic filtration

Our Manufacturing Method

The triboelectric effect involves placing two polymers with different dielectric constants in contact so that they exchange ions and create, once separated, a charge imbalance between them. This ionic disequilibrium creates a strong electric field at the microscopic level of the filter media.

In normal conditions, an atom has the right number of electrons to balance the positive charges of the atomic nucleus's protons. The atom is therefore electrically neutral, without electrostatic charge. However, when two atoms with different electrostatic properties are put in intimate contact, this neutrality can be disrupted. The electrons that gravitate around the atom that develops the less attractive force will be able to join the one that creates more, thereby generating an electron deficit on one (positively charged) and an excess of electrons on the other (negatively charged)¹.

1. Frederick Edward R., "Electrical Effect In Fabric Filtration", Filtration News, Novembre/Decembre 1995, P. 30-47.

About Texel

An ADS division, Texel is one of North America's leading manufacturers of needlepunched nonwoven fabrics for technical use. Our specialized products have been employed by American and European markets since 1967.

Texel offers the unique product or solution you need to be more competitive so you can truly stand out in your market. Creating your competitive edge is our constant goal. Every day, we explore the full potential of nonwoven materials with this goal in mind. Every day, we research ways to help you attain your business objectives by providing you with the competitive edge you need for rapid market penetration.

Your product development partner

Through our Edge Program, we can support your product development process. Contact our platform manager to learn more about Tribo technology and see how it can help you differentiate yourself.



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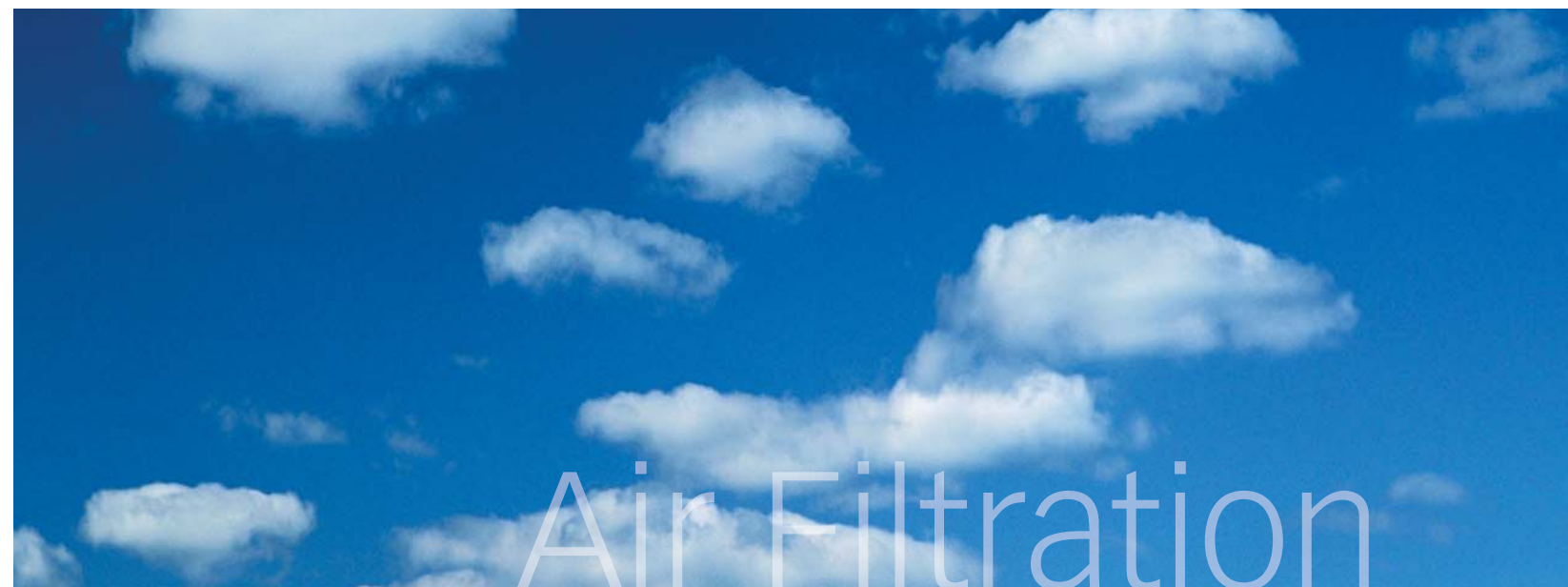
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Enhanced air filtration performance with a unique patented Triboelectric Blend



Air Filtration Application



Electrostatic filtration is well known to be highly effective in filtering very fine particles, while at the same time maintaining a low pressure drop. Ever more demanding are the performance requirements for the removal of fine particles in air filtration. To meet these tighter requirements, a triboelectric couple (Tribo™), has been developed by the research and development team at Texel.

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About electrostatic filtration

The use of electrostatic filters in air filtration has become very popular and they are now commonly used in air filtration applications such as furnace filters and respirators. Electrostatic filtration media are said to offer the following benefits:

- **more efficient filtration**
- **lower pressure drops**
- **increased capacity to filter out fine particles (< 1 µm)**

Mechanical filtration is less effective at stopping particles less than one micron in size because the fibers, whether natural or synthetic, have a diameter in the order of 20 µm (coarse fibers).

Electrostatic filtration captures particles using Coulombic attraction or repulsion and dielectrophoretic forces. These two mechanisms are effective against particles varying in size from 0.05 mm to 5 mm and are described as follows:

Coulombic attraction or repulsion: This mechanism is the result of electric charges that are on the filter and on the particle to be filtered. A particle that is therefore charged negatively will be attracted to the positively charged area of the filter media.

Dielectrophoretic forces: A dipole is led to a neutral particle when it enters the electrical field of an electrostatic filter. This dipole will then attract the particle towards the surface of the filtering media that will capture it.

The Tribo™ concept

An electrostatic filter must have two crucial characteristics. Firstly, it must comprise a large number of charges that produce strong electrostatic fields, and secondly be made of fibers with good electrical insulating properties in order to retain the charges.

The life-time of the filter's charges will be proportional to the electrical resistance of the fibers in the triboelectric couple and should be equal to or greater than the filter's service life. However, finding a triboelectric couple that would exhibit when rubbed together these two important characteristics for electrostatic filtration was key to the success of the project.

In its nature and its construction this triboelectric blend offers the following advantages i.e. high filtration efficiency against fine particles, while retaining the advantages of filters made from coarse fibers, low resistance to air flow and high dust-loading capacity.

Modeling Program

To develop products quickly and efficiently for market requirements, a mathematical modeling program for Tribo-electric filters was done. It takes into account all the variables which have an impact on the overall performance such as:

- **penetration**
- **resistance to airflow**
- **surface area**
- **loading**
- **manufacturing parameters**

This statistical approach, combined with the highly accurate models enabled the design of an optimal product and ensure that every Triboelectric filter media will meet the specified requirements.



Exceptional Performance. Minimal Resistance.



Texel continues to provide added value with its patented high-performance air filtration technology. It's a unique solution that allows you to choose the performance/weight ratio that best meets your needs.

Your benefits :

- **Consistent**, long-lasting electrostatic charge for maximum surface efficiency.
- **Choice of design:** flat, pleatable, supported, unsupported
- **Microbial protection:** helps stop the spread of bacteria, viruses and mold
- **Capable of meeting the toughest standard:** P100 from NIOSH.
- **Highest efficiency** at a given weight.

Tribo technology can be used in a variety of applications:

- **Respiratory masks**
- **HVAC filters**
- **Air purifier filters**
- **Clean room filters**
- **Various industrial applications**
- **Etc.**

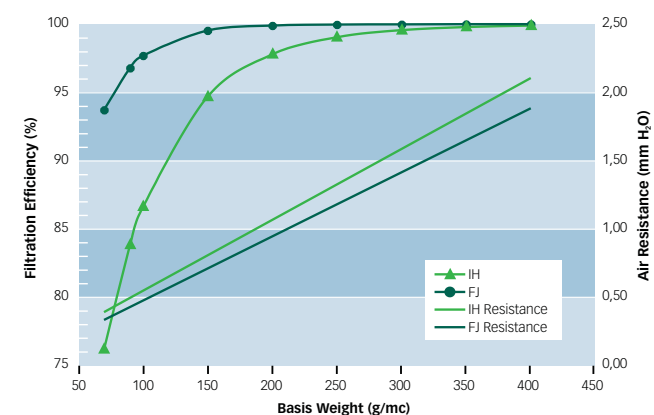
Texel's Tribo-filter line covers a range of weights from 70-400 g/m² and is aimed at a diverse range of markets such as respirators, cleanrooms, furnace filters, vacuum cleaners and cabin air filters. We can also superimpose layers for weights greater than 400 g/m².

The high ratio of filtration efficiency to air flow resistance makes Texel's Tribo-filters extremely useful in furnace filtration, cabin air filtration and vacuum cleaner filtration, by helping reduce fan motor size, power consumption, and noise levels. For the same reason it is also ideal for respirators. In practice, breathing gets easier for users and the design provides mask makers with more flexibility. Texel's Triboelectric media will help you meet with the NIOSH 42 CFR Part 84 Standard at all levels of classes N,R and P.

Knowing that the triboelectric blend made of PP(polypropylene)/PI(polymethaphenylene isophthalamide) has flexibility in terms of blend, great efficiency level despite the low proportion of PI and that the potential of the product has not been fully exploited yet, Texel's team really think that the product could help improve air filtration in a large number of applications.

Efficiency Versus Basis Weight

Testing Conditions: TSI-8130 DOP @ 33lpm



Efficiency Versus Basis Weight

Testing Conditions: TSI-8130 NaCl @ 95lpm

