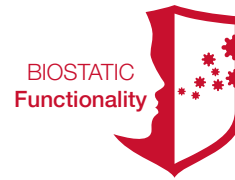


Air Filters with BioLog Technology



Effectively reduce the risk of infection in buildings where random groups of people gather.



Air filters with BioLog Technology

What is BioLog treatment?

A biostatic air filter is able to inhibit the growth and reproduction of microorganisms such as viruses, bacteria, and fungi spores, that might be present in outside and indoor air.

AAF air filters with BioLog technology can effectively reduce the risk of airborne infections, especially in healthcare facilities, office buildings, schools or other buildings where random groups of people congregate or work and airborne transmission of infectious agents can therefore become a serious problem.

In addition to protecting people from “consuming” the polluted air in a building, maintenance technicians also face a serious risk when replacing potentially contaminated air filters. Besides the use of protective clothing, air filters with BioLog technology provide a high level of additional protection for service technicians by reducing the risk of direct contact with still-active and infectious microorganisms when changing and handling used filters.

The working mechanism of the BioLog Technology

Products with BioLog Technology contain special air filter media with superior protection against infectious bioaerosols. The fiber of the filter media, which is free of any harmful chemical, and equipped with special polymeric layer which leads to the irreversible binding of infectious microorganisms like for example:

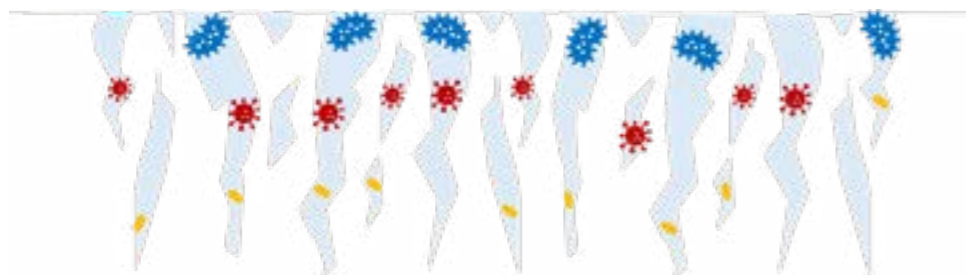
- Allergens
- Viruses
- Bacteria
- Fungi spores

The goal of BioLog technology is to effectively remove bioaerosols containing virus, allergens, bacteria and fungi spores from the air stream and to avoid re-emission to the air stream. Furthermore, in the case of bacteria, the media prevents further growth of bacteria on and through the filter media.

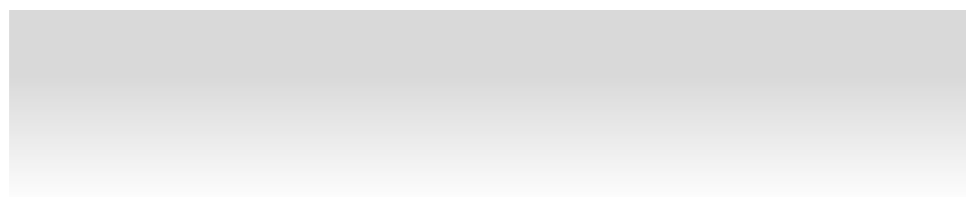
When BioLog is used, viruses, allergens, bacteria and fungi spores are irreversible bounded to the fiber surface and stay there until they degrade naturally into inactive fragments (RNA/DNA and proteins) which are also irreversibly bounded to the surface permanently.

Independent testing confirms that air filters equipped with BioLog technology re-emit no pathogenic bioaerosols after being bounded to the surface compared to any other material in the market.

Polymer layer



Filter media



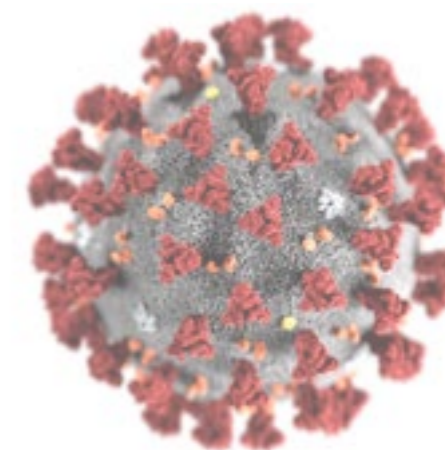
Protection against virus particles

A virus is a microscopic infectious microorganism that can only replicate inside the living cells of organisms. It consists of a small genetic material, either DNA or RNA, surrounded by a protein coat called a capsid. Some viruses also have an outer envelope made up of lipids.

Viruses are not considered as living organisms because they cannot carry out metabolic processes on their own. Instead, they rely on the host cell's metabolic machinery to produce new viral particles. Once a virus infects a cell, it hijacks the host's cellular machinery to make copies of itself. These copies then spread to other cells and can cause a range of illnesses, from mild colds to more severe diseases like influenza or COVID-19.

The size of a virus can vary depending on the type of virus. Generally, viruses are much smaller than bacteria, and they can only be seen with powerful scanning electron microscopes. The size of viruses is usually measured in nanometers (nm), which is one billionth of a meter. Most viruses range in size from 20 to 300 nm. Air filters are the method of choice for the efficient removal of viruses due to their ability to control aerosol levels in the air.

For example, the influenza virus is about 80-120 nm in diameter, while the HIV virus is about 120 nm in length. The coronavirus, also known as SARS-CoV-2, is a type of virus that causes COVID-19. The size of the coronavirus is approximately 60-140 nanometers in diameter, making it relatively small compared to other viruses.



The BioLog effect - Log 5 reduction against viruses

Only 1 virus particle out of 100.000 is not bound on the surface upon contact with the BioLog filter media.

Non-treated materials, which are market standard nowadays, show nearly no meaningful virus inactivation.

BioLog deactivates 99.99% of all virus particles after 30 seconds and 99.999% after two hours, according to ISO 18184.

In other words: only 1 virus particle out of 100,000 was not bound and deactivated upon contact with the BioLog filter.

	Without BioLog	With BioLog
Inactivation	80%	99,999%
Remaining active	20%	0,001%

Air filters with BioLog Technology

Protection against bacteria

Bacteria are the most prolific life form, dating back over 3 billion years. Though some bacteria are pathogenic (causing diseases) and most are beneficial to mankind. In fact, bacteria are crucial to the human immune system. Some are used in industrial processes such as in the production of antibiotics and pharmaceuticals. Bacteria are found on all our surfaces exposed to the environment, including the skin, respiratory, digestive and reproductive tracts.

Many studies have been carried out on the size and shape of bacteria and on their behaviour in an airstream. Most bacteria are in the size range 0.1 µm to 10 µm. When they become airborne they tend to attach to particles larger than 1 µm. This means they can be captured by a filter on which they are transported. To address this problem, **AAF offers filters with BioLog technology**. This treatment is effective against a wide range of gram positive and gram negative bacteria which have been documented to negatively affect indoor air quality.

Examples of human health affecting Gram positive bacteria (families): Bacillus, Lactobacillus, Listeria, Sarcina, Staphylococcus, Streptococcus, Streptomyces. Examples of human health affecting Gram negative bacteria (families): Aeromonas, Escherichia coli, Klebsiella pneumoniae, Legionella pneumoniae, Pseudomonas, Salmonella, Shigella.



The BioLog effect – Log 6 reduction against bacteria

Only 1 bacteria particle out of 1.000.000 was not bound upon contact with the BioLog filter media.

Non-treated materials, which are market standard nowadays, show nearly no meaningful bacteria inactivation.
BioLog deactivates 99.9999% after 2 hours, according to ISO 20743.
 In other words: only 1 bacteria out of 1,000,000 was not bound and deactivated upon contact with the BioLog filter. Such high removal rates are only known from commercial disinfectants.

	Without BioLog	With BioLog
Inactivation	0%	99,9999%
Remaining active	100%*	0,001%

* Non-treated materials, which are market standard, show even growth of bacteria on their surface.

Protection against fungal spores

There are at least 100,000 known species of fungi. The most widely known are yeasts, mushrooms, molds and toadstools. Some fungi, such as yeasts, are extremely useful to mankind. For example within the brewing process, in wine making or are used in food processing during the manufacture of cheese. In the environment, fungi play an important role in maintaining the ecological balance.

Unfortunately, what make fungi so useful to nature also make some of them undesirable to humans. Fungal spores have a negative effect on the quality of the indoor air and inhaling them causes allergic reactions in some people. Mycotoxins are substances produced under specific conditions by certain molds. These toxins may cause health problems in humans when inhaled.

If fungal spores are allowed to go through HVAC unit their spores can cause infections and disease when they become airborne. Fungi spores are reported to be one of

the main causes of Sick Building Syndrome and Building Related Illness.

To address this problem, **AAF offers filters with BioLog technology**. This treatment is effective in trapping a wide range of fungi spores which are documented to affect indoor air quality negatively.

Examples of affected fungi spore (families): Aspergillus Niger, Candida, Penicillium, Trichoderma.



The BioLog effect – Log 1 reduction against fungi spores

Only 1 fungi spore out of 10 was not bound upon contact with the BioLog filter media.

Non-treated materials, which are market standard nowadays, show nearly no meaningful fungi spores inactivation.
BioLog deactivates 90% according to DIN EN ISO 20743
 In other words: only 10 fungi spores out of 100 was not bound upon contact with the BioLog filter.

	Without BioLog	With BioLog
Inactivation	0%	90%
Remaining active	100%	10%

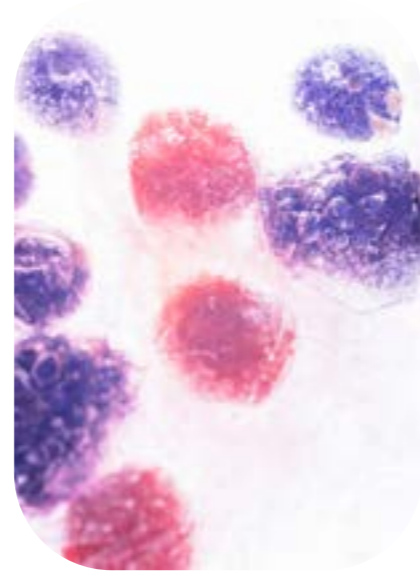
Air filters with BioLog Technology

Protection against allergens

Indoor air can contain various allergens that can trigger allergic reactions and respiratory sensitivities in susceptible individuals.

It's important to note that individual sensitivities vary, and not everyone will react to the same allergens. Moreover, some people may have multiple allergies, making it essential to identify and manage allergens specific to their condition. Reducing exposure to indoor allergens through proper cleaning, good ventilation, and the use of air filters with anti-allergenic capabilities can significantly help individuals manage allergy symptoms and maintain better indoor air quality.

Common allergens found in indoor air include dust mites, pet dander, pollen, mold and spores. **AAF offers filters with BioLog technology** to remove allergenes.



The BioLog effect – Log 2 reduction against allergens

Only 1 particle with allergenic potential out of 100 was not bound upon contact with the BioLog filter media.

Non-treated materials, which are market standard nowadays, show nearly no meaningful allergens inactivation

BioLog deactivates 99% according to OFI SOP 350.001.

In other words: only 1 particle with allergenic potential out of 100 was not bound upon contact with the BioLog filter.

	Without BioLog	With BioLog
Inactivation	0%	99%
Remaining active	100%	1%

Regulatory

EU Biocidal Products Regulation (BPR) 528/2012 is a regulation of the European Union that governs the placing on the market and use of biocidal products in the EU. The regulation applies to any substance or mixture that is intended to destroy, deter, render harmless, or control harmful organisms, such as pests and microorganisms, by chemical or physical means.

AAF's biostatic filtration does not fall under BPR EU 528/2012 regulation since AAF air filters with BioLog Technology use filter media underlies a physical mode of action to irreversibly bind & deactivate pathogenic microorganisms on its surface.

Regular maintenance and replacement of BioLog air filters are necessary to ensure their continued effectiveness in reducing or eliminating the concentration of microorganisms in the air.

Properties of filters with BioLog Technology

AAF has carefully developed the BioLog technology to ensure a good performance of the treated air filters. BioLog does not affect the filters' efficiency or performance levels. The treatment has been designed for a long lasting effect during the filters' period of use. The durability of the treatment ensures that treated products retain their performance after many exposures to moisture.

There is no detectable off gassing from the air filters in which BioLog is applied. Used filter elements can be safely disposed in a landfill or in a municipal incinerator. Always dispose used air filters according to the local waste disposal regulations.

Air filters with BioLog Technology

VariCel V XL BioLog

Product features:

- Biostatic functionality (Allergenes, Viruses, Bacteria, Fungi spores)
- ISO 16890: ePM1 55%, 75% and 85%
- Filter class F7, F8 & F9
- High airflow capacity and low resistance
- Maximum dust holding capacity
- Lightweight and easy to install
- Fully incinerable

Typical applications:

- Commercial Buildings
- Food & Beverage
- Healthcare
- Schools & Universities



VariCel M-Pak BioLog

Product features:

- Biostatic functionality (Allergenes, Viruses, Bacteria, Fungi spores)
- ISO 16890: ePM1 55 %, 75% & 85%
- Filter class F7, F8 & F9
- Space saving design - reduces freight, storage and handling costs
- Lightweight and easy to install
- Non-corrosive
- Fully incinerable

Typical applications:

- Commercial Buildings
- Food & Beverage
- Healthcare
- Schools & Universities



VariCel EcoPak BioLog

Product features:

- Biostatic functionality (Allergenes, Viruses, Bacteria, Fungi spores)
- ISO 16890: ePM1 55 %, 75% & 85%
- Filter class F7, F8 & F9
- Space saving design - reduces freight, storage and handling costs
- Lightweight and easy to install
- Non-corrosive
- Fully incinerable

Typical applications:

- Commercial Buildings
- Food & Beverage
- Healthcare
- Schools & Universities



AAF Europe / Dinair Sales Offices



Germany and Headquarter Europe

AAF-Lufttechnik GmbH
Odenwaldstrasse 4
64646 Heppenheim
+49 (0)6252 69977-0
Sales.DACH@aafeurope.com
www.aafeurope.de

Denmark

AAF/Dinair APS
Vallensbækvej 63.1
2625 Vallensbæk
Phone: +45 70260166
sales.denmark@aafeurope.com
www.aafeurope.dk

Finland

Dinair Clean Air Oy
Koivuvaarankuja 2
01640 Vantaa
Phone: +358 10 3222610
cleanair@dinair.fi
www.dinair.fi

France

AAF France
9 Avenue de Paris
94300 Vincennes
Phone: +33 1 43 98 42 23
sales.france@aafeurope.com
www.aafeurope.fr

Greece

AAF-Environmental Control Epe
Ifaistou & Kikladon
15354 Glika Nera
Tel.: +30 210 6632015
Greece@aafeurope.com
www.aafeurope.gr

Italy

AAF Srl
Via Friuli, 28/30
21047, Saronno (VA)
Tel: +39 02.9624096
sales.italy@aafeurope.com
www.aafeurope.it

Latvia

Dinair Filton SIA
Rupnicu Street 4
Olaine, Latvia, LV-2114
+371 67069823
Dinair.latvia@dinair.se
www.dinair.lv

The Netherlands

AAF International BV
Hooggoorns 56
7812 AM Emmen
Tel: +31 (0)591 - 701025
aaf.verkoop@aafeurope.com
www.aafeurope.nl

Norway

Dinair AS
Prof Birkelands vei 36
1081 Oslo
Phone: +47 22 90 59 00
post@dinair.no
www.dinair.no

Slovakia

AAF International s.r.o.
Bratislavská 849
91105, Trenčín
Phone: +421 32 746 17 39
aafslovakia@aafeurope.com
www.aafeurope.com/sk

Spain

AAF S.A.
C/ Vidrieros, 10
28830 San Fernando de Henares, Madrid
Tel: +34 916 624 866
Customer.ServiceSP@aafeurope.com
www.aafeurope.es

Sweden

Dinair AB - Head office
Hamngatan 5
SE-592 30 Vadstena
Tel: +46 (0) 143-125 80
info@dinair.se
www.dinair.se

Ånäsvägen 18

511 56 Kinna
+46 (0) 320 20 90 70
order.industries@dinair.se

United Kingdom

Air Filters Ltd (AAF International)
Bassington Lane, Cramlington
Northumberland NE23 8AF
+44 01670 566761
airfilter@aafeurope.com
www.aafeurope.co.uk/



AAF International
European Headquarters
Odenwaldstrasse 4, 64646 Heppenheim
Tel: +49 (0)6252 69977-0
aafeurope.com

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