airsuite

Indoor filtering systems

Rhoss solutions guarantee high quality air

RHOSS

AIR'SUITE FILTER

Breathe clean air, Save your health & Improve your productivity

INVEST FOR YOUR LIFE

BACKGROUND

DID YOU KNOW?

INDOOR & OUTDOOR HARMFUL POLLUTANTS

▲ Outdoor pollutants considered to evaluate productivity benefits ■ Indoor contaminant considered to evaluate health benefits

RESEARCH TOPIC

WHO IS AT RISK?

- OFFICE WORKER
- SENIOR
- PEOPLE WITH DISEASES
- CHILDREN
- PREGNANT WOMAN

WHICH BUILDINGS?

- OFFICE
- HOTEL
- HOSPITAL
- SCHOOL

HEALTH IMPACTS

SHORT TERM EFFECTS	LONG TERM EFFECTS
HEADACHE	CENTRAL NERVOUS SYSTEM DISEASES
NOSE, THROAT, EYES INFLAMMATION	CARDIOVASCULAR DISEASES
COUGHING	RESPIRATORY DISEASES (asthma, cancer)
PNEUMONIA, BRONCHITIS	IMPACTS ON LIVER
SKIN IRRITATION	IMPACTS ON REPRODUCTIVE SYSTEM

PRODUCTIVITY IMPACTS

- ABSTENTEEISM FROM WORK OR SCHOOL
- REDUCTION OF WORK PERFORMANCE
- REDUCTION OF SCHOOL LEARNING

WHY CHOOSE THE AIR'SUITE FILTER IN HVAC SYSTEM?

CASE STUDY
Office Building
67 Employees

STEP 1 — BACTERIA AND OUTDOOR POLLUTANTS
STEP 2 — FILTER COSTS
STEP 3 — ENERGY SAVINGS
STEP 4 — HEALTH BENEFITS
STEP 5 — PRODUCTIVITY BENEFITS
STEP 6 — COST-BENEFIT ANALYSIS

HEALTH

	Abatement Capacity		Costs		Benefits	Benefits	Cost-Benefit Analysis
	S. Aureus	E. Coli	Investment	Energy	Energy Savings	Health	
REFERENCE FILTER NOT TREATED	0%	0%	65€(*)	244€/y	–	–	$\frac{B}{C} = 17.85$ ✓
AIR'SUITE FILTER	98%	53%	150€(*)	156€/y	88€/y	83.33€/y	$\frac{B_a - B_r}{C_a - C_r} > 1 \quad \beta > \alpha$

(*) Medium size filter

PRODUCTIVITY

	Abatement Capacity				Costs		Benefits	Benefits	Cost-Benefit Analysis
	CO_2	SO_2	NO_2	PM_x	Investment	Energy	Energy Savings	Productivity	
REFERENCE FILTER NOT TREATED	0%	0%	0%	0%	913€(*)	244-292.8€/y	–	–	$\frac{B}{C} = 0.06 < 1$ ✗
AIR'SUITE FILTER	1%	20%	5%	5%	150€	156€/y	88 - 136€/y	1,842.5 - 7,370€/y	$\frac{B}{C} = 22 > 1$ ✓

(*) 808 (big size filter) + 833€ (air handling unit)

Innovation for human well-being

Rhoss sets new indoor comfort standards by improving the hedonistic aspect of the air intake in the rooms through broad spectrum “biocide filtration”.

Air’Suite®

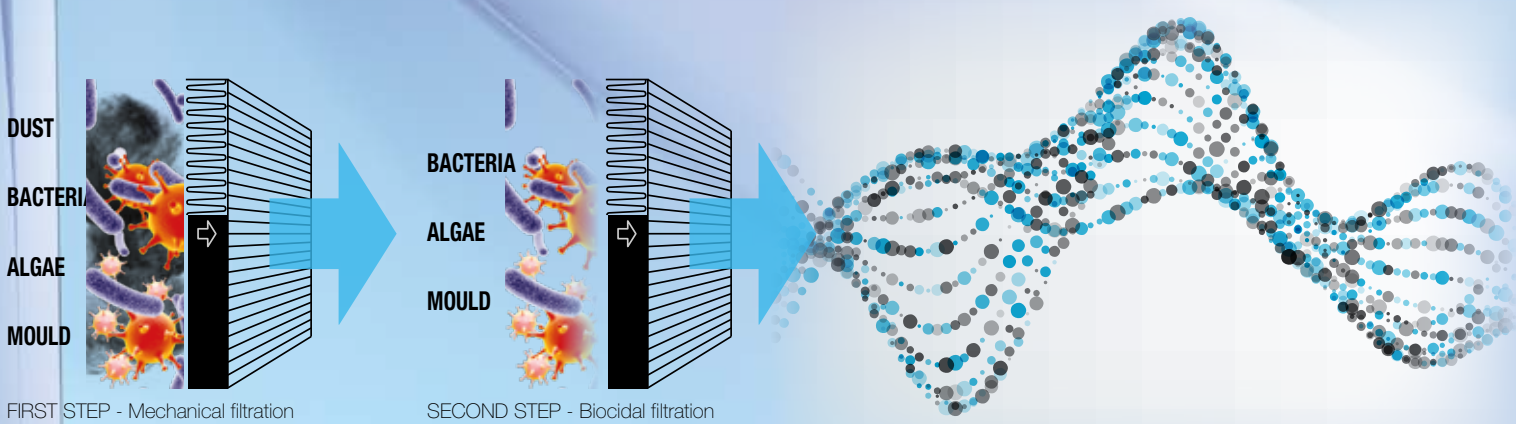
A new way to treat the air that we breathe every day in indoor environments. It involves systems for olfactometric conditioning and the filter range, i.e. the line of filters that can be used in any ventilation and air conditioning application. A new concept of biocidal filtration that assures the removal of microbiological contamination without requiring additional solutions to be installed or existing systems to be modified.

Healthy environment

Living in a clean environment is a concept closely linked to breathing “clean air”. It has been established that the concept of clean air, i.e. free from any additional factors, such as odours or pathogens, which can directly or indirectly affect or alter a person’s physical or mental state, must be related to high standards of Indoor Air Quality. It is no longer possible to believe that outdoor air is clean: the increase in production facilities, with varyingly controlled emissions in the atmosphere, and vehicular traffic make it actually impossible to use outdoor air to dilute indoor contaminants without proper handling. This is combined with the fact that, where energy saving is strategic, the amount of fresh air is reduced to the minimum legal limits.

Regulatory issues

Through the “2004-2010 European Environmental and Health Action Plan”, the European Union had already set the improvement of air quality as a priority objective together with the development of new countermeasures to the increase in diseases and syndromes associated with long times spent in confined, high density environments (SBS: sick building syndrome).
The latest EU studies have estimated that the number of deaths correlated to poor outdoor air quality is greater than that due to road accidents. That is why, on 18 December 2013 the Community decided to implement a “new set of policies to clean up the air in Europe”. The set of policies concerning clean air is an update of existing laws and sets a further reduction in harmful emissions arising from industry, traffic, energy converting plants and agriculture, seeking to limit their impact on human health and the environment.
The newly implemented set of policies includes several measures to ensure the short-term achievement of existing objectives and new air quality targets to be reached up to 2030.



FIRST STEP - Mechanical filtration

SECOND STEP - Biocidal filtration

Biocidal filtration

Biocidal filtration refers to a combination of granular filtration (conventional) and inactivation of the organic load (innovative) on the same amount of air which passes through the same filtration medium. This process has been achieved by using a new, appropriately functionalised bio-polymer, characterised by: wide availability in nature, biocompatibility, non-toxicity and intrinsic infection preventing properties.

R&D and testing

The **Air'Suite®** filters were tested with new, state-of-the-art techniques that measure the actual biocidal ability on the filter surface and that do not make use of cultures but count each organism/cell and its integrity or ability to reproduce. The bacteria removal efficiency was measured through a study protocol with IRSA-CNR certified flow cytometry techniques. The resulting efficiencies are higher than 50% of "instant" removal and 100% within 30 hours after contamination.

Air'Suite® filter

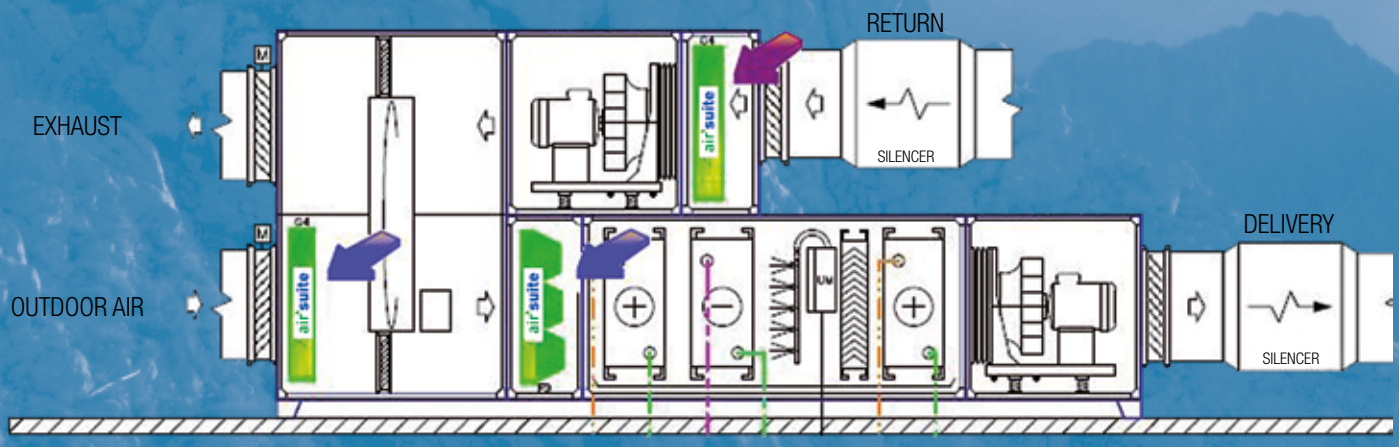
Applying the **Air'Suite®** filter to a Rhoss air handling system of the ADV Custom or Next Air Ranges assures decontamination from microbiological agents (bacteria, moulds, viruses, algae, etc.) of the air and filtration device as well.
An effect that requires no change to the existing or new air conditioning system and that does not require any additional cost for the installation of additional equipment. The conventional filtration unit simply needs to be replaced with the **Air'Suite®** filter line.
Its development has met the following essential requirements, in order to assure immediate use and no short or long-term contraindications:

- the electrical loads of the system are not altered;
- the design levels of filtration are not changed;
- no formats or multi-cell compositions other than existing are required;
- no special frames or specific filter integration systems are required;
- no additional maintenance is required.

The replacement times are determined by the pressure drops due to dust contamination (as for classic filters) and not by the biocidal power.

Additional benefits:

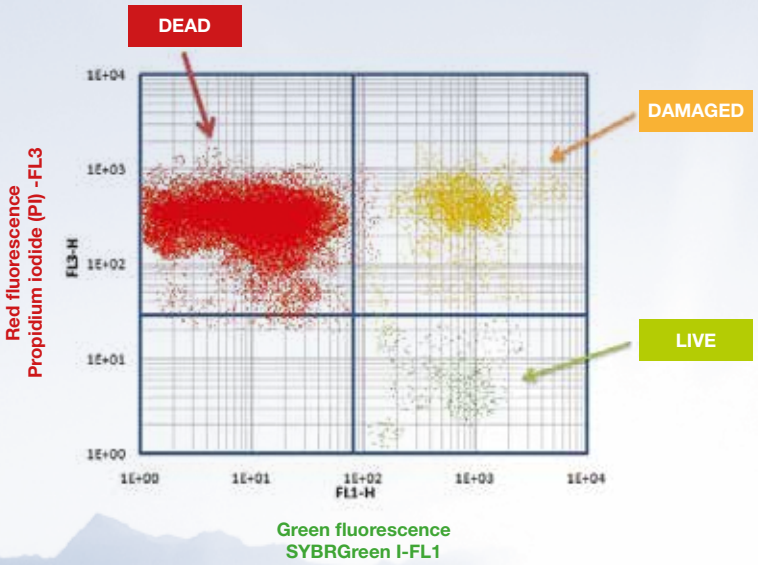
- contamination by "proliferation" of algae, moulds, fungi or bacteria on the filter surface is completely inhibited;
- the filter is auto-decontaminated. If left in the environment it does not become a source of contamination;
- the possible release of biological material in air ducts, unlike conventional filters, is not active, therefore, it cannot proliferate again in other parts of the air conditioning system.



Example of Air'Suite® application

Particularly sensitive fields and contexts to indoor air quality

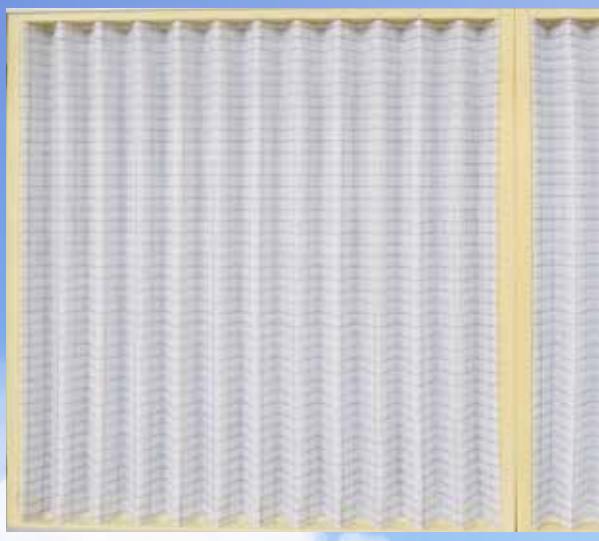
- **Cinemas, theatres, shopping centres and highly busy places in general**
- **Hospitals, clinics, nursing homes, outpatient clinic waiting rooms**
- **Offices, meeting rooms and conference rooms**
- **Restaurants, cafés, bars**
- **Hot baths, spas, swimming pools, gyms**
- **Schools, kindergartens, etc.**



Biological removal efficiency of Air'Suite Filter

Biocidal pre-filtration

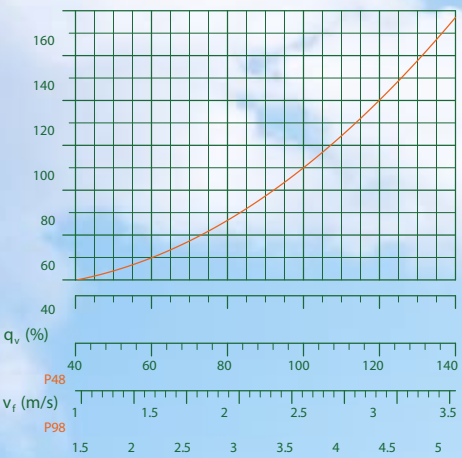
for ADV Custom and Next Air



Characteristics

Synthetic fibre corrugated filter cell with progressive density and a biopolymer layer functionalised with biocidal power. Filtration class ISO COARSE 55% according to ISO 16890 (G4 EU 779).
The filtration medium is protected by a wire mesh on both sides to assure pack consistency and fold evenness. Micro plastic material mesh to increase the capture effectiveness by electrostatic effect. The larger filtering surface (compared to planar cells) assures higher dust holding capacity (DHC) and therefore, a longer service life. The filter is immersed in the frame made of rigid polyurethane with delayed flame propagation. Thanks to that, the bypass leaks between media and frame typical of these filters are near-zero, disposal costs are very low because the product is fully incinerable. Its weight is less than half that of a comparable ordinary filter.

Corrugated cell_ model MEZ-ASL class G4



(V = front speed)

Recommended applications

The ISO COARSE 55% self-decontaminating biocidal filter is commonly recommended as initial filtration stage to protect the AHU elements placed downstream, not only from solid airborne particles but also from microbiological agents (bacteria, moulds, viruses, algae, etc.) from the outdoor air or from the ambient inlet air.

Available also for fan coil units

The flat Air'Suite® filter with filtering grade ISO COARSE 40% according to ISO 16890 (G2 EN 779) is available as an accessory, also for fancoils (Yardy, Yardy-I, YardyDuct, YardyID, and YardyHP) range versions with a cabinet, recessed and ductable, Air'Suite® is supplied as an accessory already fitted in the unit or supplied separately. In this case, the standard G1 filter must simply be replaced.
Alternatively, duct installations are provided with a frame and filter that can be removed in any direction.

Biocidal type fine filtration

for ADV Custom and Next Air

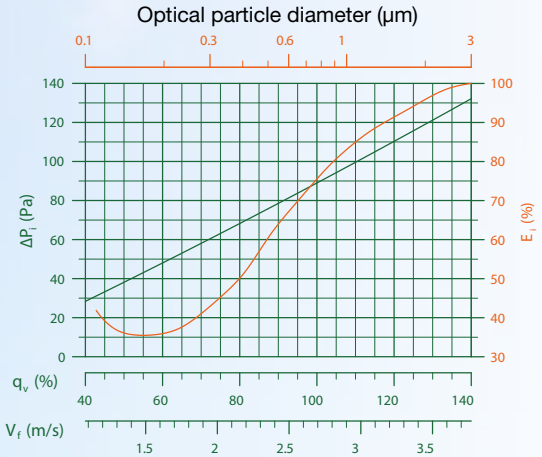
Characteristics

4V rigid bag biocidal filters are available in the following filtration classes:

- class ISO and PM1 50% according to ISO 16890 (F7 EN 779)
- class ISO and PM1 70% according to ISO 16890 (F8 EN 779)
- class ISO and PM1 85% according to ISO 16890 (F9 EN 779)

The low energy impact, 4 dihedral frame combines the low resistance to motion with a high filtering surface, which assures long service life and low energy costs.
The filtration medium is made of water repellent glass fibre paper, pleated with controlled pitch including the patented functionalised biopolymer for biocidal treatment. Separation performed with continuous thermoplastic thread.
The blue injection moulded plastic frame (polystyrene) assures high cell rigidity, thereby preventing bypass leaks between the frame and the media that are sealed together with polyurethane (two-component).
The filter is fully incinerable, thereby significantly reducing the product disposal costs.

Rigid bag filter_ model 8RTE-ASL class ISO and PM1 50%

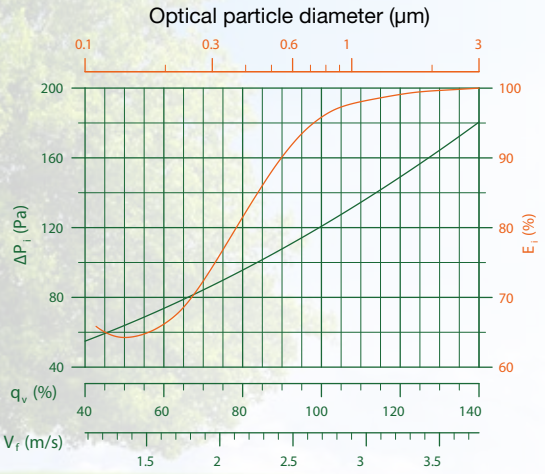


(Vf = front speed - Ei = initial efficiency)

Recommended applications

The PM1 50-70-85% self-decontaminating biocidal filters are commonly recommended as the following filtration stage:
Intermediate, to protect the downstream AHU elements not only from solid airborne particles but also from microbiological agents (bacteria, moulds, viruses, algae, etc.) from the outdoor return air or recirculated air.
Final: as the last AHU element to ensure the air introduced in the system (or exhausted by the machine) is free from any type of organic contaminant either endogenous (proliferated within the AHU) or exogenous (conveyed by the outdoor air), thereby ensuring the desired level of Indoor Air Quality in the environment is achieved.

Rigid bag filter_ model 10RTE-ASL class ISO and PM1 85%



(Vf = front speed - Ei = initial efficiency)

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