

english version 4.0

wivactive
TECHNOLOGY

VIMALUX

VIMALUX



WATER
FILTER

WITEK was born from the aggregation of professionals who have distinguished themselves in the fields of research, engineering, marketing and international trading. Together, they decided to channel their know-how and their experiences into this new business reality, which is entering, with its technological and human assets, within a market that is increasingly oriented towards sector specificity.

All this guarantees the right answer, in terms of design and production of products, able to satisfy requests based on people's health and well-being.

Thanks to its strong orientation towards innovation and the consolidated collaboration with research centers and institutes of absolute importance, **WITEK** effectively oversees important areas of scientific and technological know-how such as organic chemistry, research into materials, nanotechnology, sensors, optics, electronics, mechanics.

WITEK products are exclusively **Made in Italy**, with production chains certified by the selection of suppliers that guarantee the excellence of materials and workmanship.

WITEK, in the course of its development, will always be at the forefront of its commercial offer, carefully observing its commercial terminals in terms of needs and requirements.

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Indoor pollution

The environment's pollution **problem**

The invisible **problem** indoors

In closed environments there are invisible elements that, through the air we breathe, enter our body. Outdoor and indoor air pollution is considered by the World Health Organization as the main environmental risk factor of population's health.

The **cause** of the pollution

Many products that we all have at home or in the office and that we use frequently are a source of pollution because they generate harmful substances such as: **fine dust, mold, mites, bacteria, carbon monoxide, nitrogen dioxide** and a large family of molecules, the "**compounds volatile organic**". This category of compounds (VOCs) includes a number of substances, all of which contain carbon in complex mixtures that can cause short and long-term damage to human health, even reaching carcinogenic effects.

Example of some products that release harmful substances into the air:
Furniture, Glues, Paints, Solvents, Rugs and carpets, Cosmetic sprays, Detergents, Soaps

The pollution's **dangers**

Between the hours we spend at home, those spent in the office, school, gym or shopping center, it is estimated that 90% of our life in the city takes place indoors. This is why **indoor air quality is of fundamental importance for our health**. In many areas of Europe, life expectancy is reduced by one year due to air pollution and that 90% of the population living in urban areas is exposed to unsafe levels of pollutants. The air in confined spaces, on average, is 5 to 10 times more unhealthy than outside due to the accumulation of pollutants.

90%

Time of day
that we spend
indoors

5x

Indoor pollution
is 5 times
higher than
the external one

350

Millions
of particles
ingested every
minute

90%

The amount
of PM10 compared
to all the particles
in the air



Harmful substances

The substances we are talking about can be divided into two macro groups. On the one hand, the chemical-physical pollutants: combustion gases (such as nitrogen oxides (NO_x), sulfur dioxide (SO₂), carbon monoxide), atmospheric particles, dust, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (IPA), radon, and even secondhand cigarette smoke. On the other hand, however, those of more purely biological origin: bacteria, pollen, mites, biological residues and other types of allergenic compounds. Substances that have effects on the respiratory system, causing asthma and allergies, disorders of the immune system, damage to the cardiovascular and nervous systems, as well as to exposed skin and mucous membranes. Even more dramatic, perhaps, are the effects of radon: a colorless and odorless radioactive gas, which in some areas of Italy spontaneously emerges from the ground and accumulates indoors, binding to fine dust, thus reaching the bronchi. Here its radioactive decay irradiates the cells of the lungs, causing damage to the DNA that can also cause lung cancer. Finally, phthalates deserve a separate discussion: chemical compounds used in the plastics industry to improve flexibility and moldability, and which are part of the atmospheric particulate matter. Indoors, they can be found almost everywhere, and with the deterioration of objects linked to time and cleaning, they are released into the air and tend to accumulate.



The safe **solution** against viruses and bacteria

Patented and certified technology for indoor air sanitation

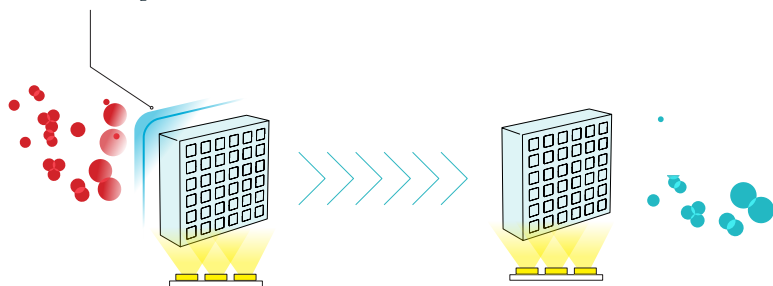
What is **wivactive** technology

Wivactive is a safe and effective technology for sanitizing indoor air through a photocatalytic system with LED light inside the **GearBox** filter. A certified system capable of eliminating up to 99.9% of viruses, bacteria and harmful substances.

LED visible light **photocatalysis**

Photocatalysis is a sanitizing process activated by the combination of **visible LED light** and **doped titanium dioxide**. Doped Titanium Dioxide (TiO₂) which is activated by the visible light generated by a special LED board calibrated on an adequate visible light wavelength which triggers a process called oxidative photocatalysis. The patented substance applied on the ceramic filters or on the various supports is photo-active, that is, it is "activated" by the visible light LED with a calibrated spectrum, generating free radicals (molecules which, instead of being neutral, are charged and very reactive), which go to attacking polluting molecules (such as viruses or bacteria) by breaking their chemical bonds and degrading them.

Sanitizing reaction between TiO₂ and LED light



A special **LED light** illuminates the ceramic filter coated with **titanium dioxide**, activating the sanitizing process of **photocatalysis**.

Harmful substances that come into contact with the filter surface are destroyed by free radicals generated during **photocatalysis**.

Photocatalysis is activated by the combination of:

TiO₂

Titanium dioxide doped with nanomaterials



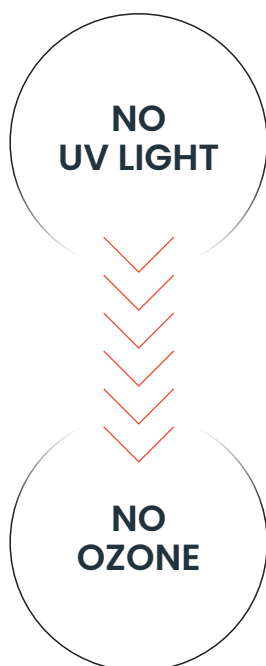
LED light

Exclusive LED board with calibrated spectrum

Action sanitizing antibacterial and antiviral

UV light can be harmful for man

UV/UV-C light creates ozone, a highly harmful substance for humans and animals in the environment, therefore it is not recommended in the area of air sanitation, as its use is not safe for health.

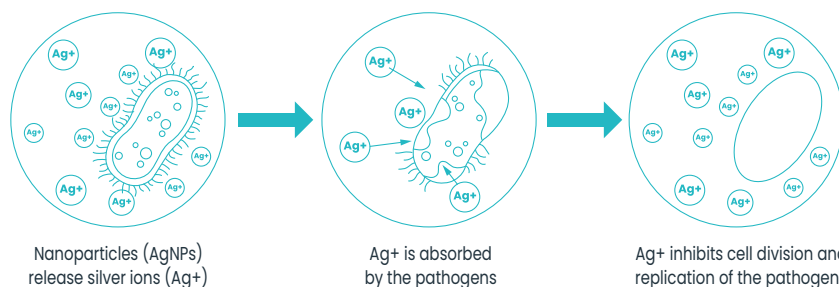


H24 air sanitation safe for humans

Sanitizing the air during all hours of the day is important because it guarantees constant protection from viruses, bacteria and harmful substances, even in the busiest times of the day. Our technology uses a photocatalytic system activated by a special LED light, which in addition to being 99.9% effective is absolutely safe in the presence of man and can therefore remain **active 24 hours a day**. has been patented in order not to release any harmful substance into the air, unlike other similar systems, such as those with UV light, which during their use produce, even if in small quantities, harmful gases such as ozone which can be harmful to the man.

The Silver ions

The silver molecules, together with the titanium dioxide react with the water molecules present in the air and release silver ions, allowing the purification of the air itself by exercising an antibacterial action even in the absence of light.

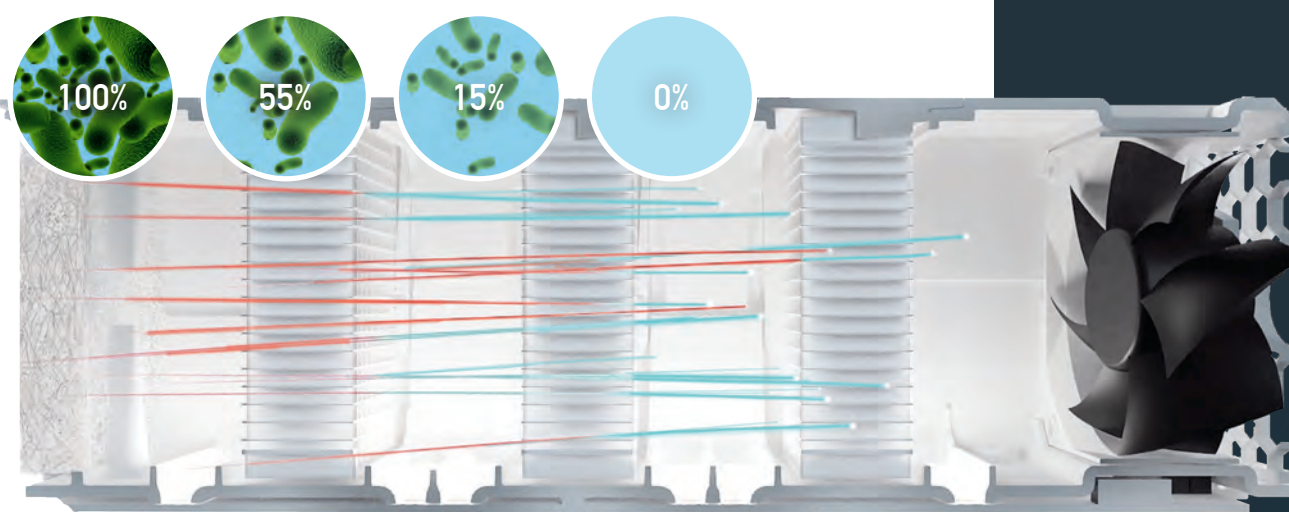


GearBox Filter

Heart of the system, the GearBox filter

What is the GearBox Filter

The **GearBox** is the element in which the photocatalytic sanitizing process is activated. It is composed of a G4 inlet filter, 3 ceramic filters with doped titanium dioxide, a **calibrated visible light LED source** and finally an extremely quiet fan that guarantees efficient air circulation.



1° Filtering Stage

G4 filter. The quality of this filter allows stopping of larger particles, it comes down to 100% PM10 and up to 40% PM2.5.

2°/3°/4° Filtering Stage

The three ceramic filters coated with doped titanium dioxide activated by an exclusive optic scheme (WIVA patent) allows a massive reduction of harmful substances.

LED Sources

The LED source installed on board is calibrated in the visible light spectrum which allows the photocatalytic activation of the filter, ensuring to the parts the correct lighting and energy supply.

Suction

Forced suction ventilation through the use of a magnetic levitation fan that ensures the right air circulation in the environment with very low noise.

Ceramic filter

The ceramic filter, coated with doped titanium dioxide and illuminated by a LED source with spectrum calibrated on the visible, activates the sanitizing process of photocatalysis. Its cell morphology widens the intervention surface, making it extremely efficient.

COATING WITH DOPED TITANIUM DIOXIDE

**TOTAL AREA DEVELOPMENT
FOR EACH INDIVIDUAL FILTER**

100.000 cm²

HIGH POROSITY CERAMIC FILTER

SUBSTANCES ELIMINATED FROM THE WIVACTIVE SYSTEM

Virus

Germs

Bacteria

Carbon
monoxide

VOCs

NOx

Unpleasant
smells

Spores
& Pollen

Research & development

Creativity, flexibility and competence are the key points on which the research and development activity is based

Creativity, flexibility and competence are the key points on which the research and development of **WITEK** is based. Thanks to its strong orientation towards innovation and its consolidated collaboration with Research Centers and Institutes of absolute importance, Wiva Group effectively oversees important areas of scientific and technological know-how, such as organic chemistry, research of materials, nanotechnology, sensors, optics, electronics, mechanics.

WITEK Tech Lab is equipped with cutting-edge technical instruments and highly qualified personnel to oversee all ongoing research activities. Working closely with certification bodies and accredited laboratories, the **WITEK** in-house Tech Lab is not only able to manage all the crucial aspects relating to the phase planning, quality control, certification of results, verification of legal and performance compliance, but especially to the study and research of new technological solutions that have a patent character.

The particular sensitivity to the problems of energy saving, protection of the environment and health, combined to the analytical ability and methodological rigor, connote the company's research activity, allowing **WITEK** to devise original solutions and identify innovative applications that translate into concrete proposals for a market in constant evolution.



Collaborations and partners

INO CNR

National Institute of Optics – National Research Council

The National Optics Institute activities are divided into programs of pure and applied research, technology transfer, consultancy for public bodies and companies. To these they add measurement, testing and training services.

IIT CNI

Center for Nanotechnology Innovation

Interdisciplinary Center for Research and Development of Phenomena on nanometer scale. The lines of research range from medicine molecular to advanced diagnostics up to nanosystems that store energy and optimize processes of operation.

IFAR CNR

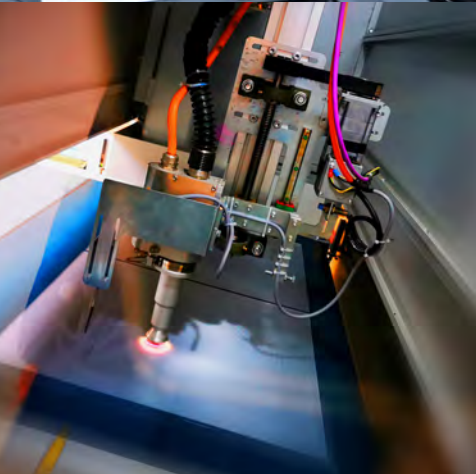
Institute of Applied Physics – National Research Council

IFAR conducts research, experimental development and technology transfer in many areas of Applied Physics (space, health, nanomedicine and safety), of Fundamental Physics (optics, photonics, matter physics) and ICT.

CE.RI.COL

Scaling up new materials

Cericol Research Centre Colorobbia is one of the most advanced Italian laboratories in the field of new materials. Collaborations with the most prestigious national and international research institutes run Cericol into highly innovative activities in the majority disparate scientific fields.



Patents wivactive

Exclusive and unreproducible make this unique technology

The validity of the **wivactive technology** places its veracity on the patents obtained by independent certification laboratories. All the tests carried out have proven the effectiveness of the sanitation system which is characterized by its effectiveness in destroying viruses, bacteria and harmful substances.

Nanomaterial exclusive patent

Wivactive is made up of a base of Titanium Dioxide TiO_2 doped with Nitrogen (N) and other elements subject to secrecy and patent.

The **wivactive** material has reduced the energy level $E_g = 2.7eV-2.9eV$ and therefore is able to get excited even at wavelengths on the visible, in a significant way.

Exclusive patent on the production process

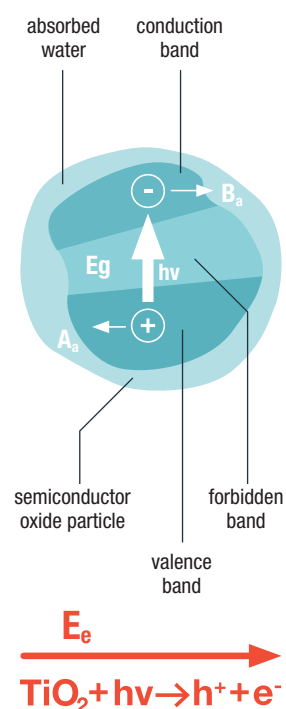
Having the possibility of making a nanoparticle-based coating process reproducible and therefore stable is a very demanding job. The coating and surface softening by means of an oven allows a secure fixing of the nanocomposite to the support.

Exclusive patent for photocatalytic functionality

The **wivactive** system uses a revolutionary optical scheme to obtain greater homogeneity and very low pressure drop, which is essential for filtration systems.

Exclusive patent of the calibrated spectrum LED board

The know-how acquired in the lighting field for over 20 years has made it possible to develop a spectrum **LED light scheme calibrated** on customized frequencies in order to obtain maximum effectiveness in terms of activation of the nanomaterials present in the **wivactive** system.



LED board





Study and research

Studies and research carried out by **WITEK**, in partnership with CE.RI.COL., have led to the development of a unique nanomaterial. The result is a TiO₂ doped with nitrogen and silver nanoparticles together with particular chemical elements. This particular and unique mixture has allowed us to eliminate the use of UV rays to perform a photocatalysis process. The doped silver nanoparticles and TiO₂ react with the water molecules present in the air, releasing free radicals, but also silver ions capable of oxidizing most of the organic VOC contaminants, breaking down nitrogen oxides (NO_x), carbon monoxide and also to control and reduce the bacterial load due to fungi and bacteria.

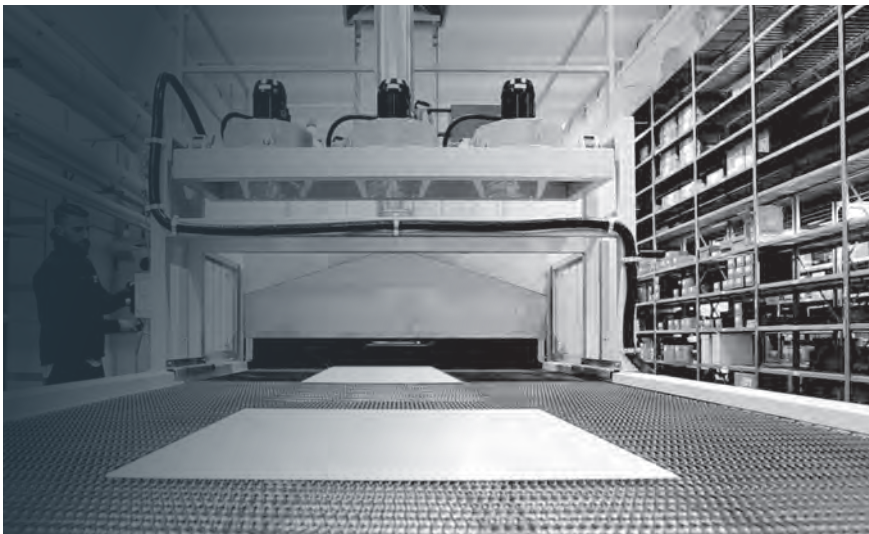
All without the creating of Ozone and UV.



Production plant

Absolute European excellence in the treatment of nanocomposite materials.

WITEK has designed and built under the scientific supervision of CE.RI.COL a production plant dedicated to sanitizing products. The plant represents an absolute European excellence in the treatment of nanocomposed materials. For the design of a production line with the characteristics necessary to meet the technological requirements suitable for **treatment of nanocomposites**, it took years of research and experimentation. The processes related to the treatment of elements, such as ceramic filters that are on board the **GearBOX** as well as the coating of surfaces and materials inherent to sanitizing products, provides a certified industrial principle. All stages of this delicate process take place in our factory and this allows total control of all functions both technological and industrial.



Machine active during the cooling process

The **ASINA** project

The treatment plant with **wivactive technology** is designed, according to the methods of Safe-by-Design (SBD), through the European project ASINA “Anticipating Safety Issues at the Design Stage of NANO Product Development”. The project is coordinated by the ISTEK Department of the CNR and is made up of 21 partners including Research Centers, Universities, European and non European NGOs and companies, including **WITEK**.

<https://www.asina-project.eu/partners/>



The phases of application of nanomaterials

The coating of nanomaterials on a surface takes place inside a special machine through 7 phases:

- 1 Activation
- 2 Preheating
- 3 Coating
- 4 Heating phase 1
- 5 Heating phase 2
- 6 Heating phase 3
- 7 Cooling down



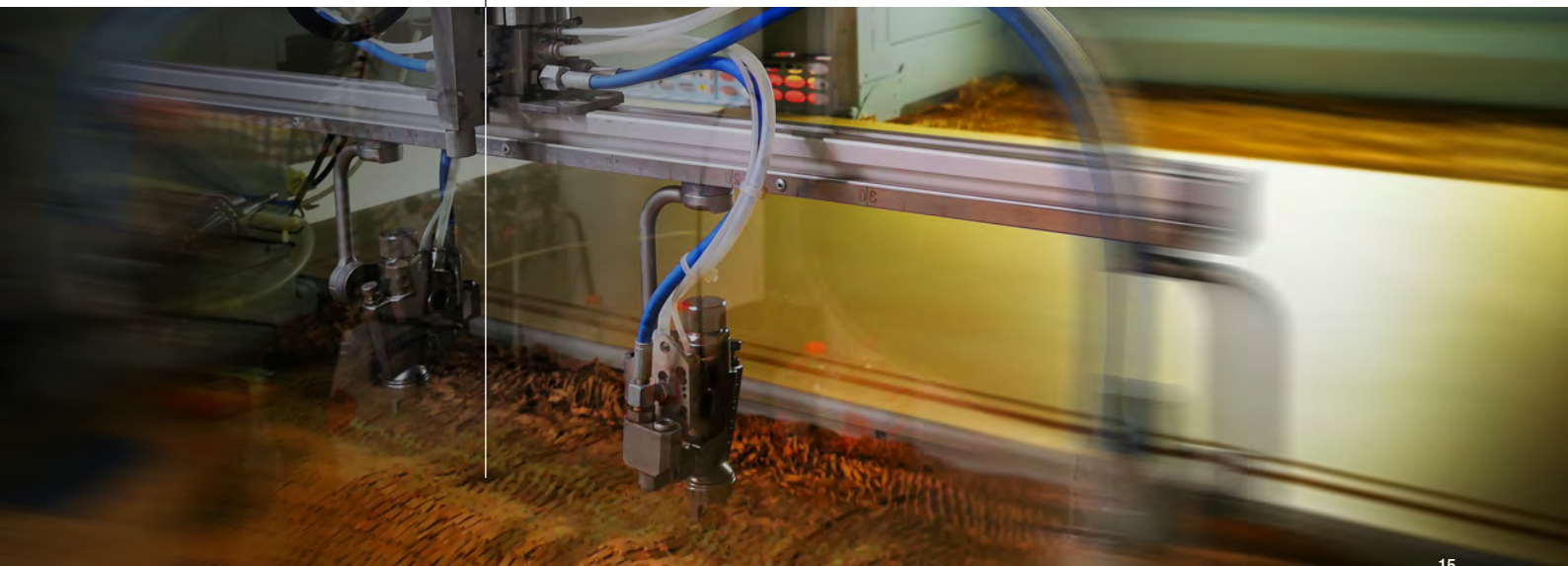
“This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 862444”



The coating process

The nanomaterials are applied to the surfaces through a specifically developed coating treatment. The mixing and fixing of the nanocompound is a process that requires absolute knowledge of the chemical dosages and temperatures suitable for softening the fine surfaces to let the nanotitanium to penetrate at a molecular level on the support to be treated. The particular chemical composition of this substance, based on a special patented formula of titanium dioxide doping with silver and other elements, ensures that it is activated simply thanks to the action of artificial visible light, even in the absence of UV rays.

Machine active during the coating process



The certifications



Guaranteed safety and reliability

The **wivactive technology** has obtained certifications issued by the most important Italian and European laboratories that guarantee the killing of Viruses (SARS-CoV, SARS-CoV-2), Bacteria such as Escherichia Coli, NOx (nitrogen oxides) and VOCs (compounds volatile organics) such as formaldehyde.

Coronavirus

The antiviral certification obtained by **wivactive technology** is based on the analysis of the Bovine coronavirus virus (SsCoV-1). Bovine coronavirus represents the surrogate virus of all Betacoronaviruses (as per documentation released by the World Health Organization) which includes viruses such as **OC43, HKU1, SARS-CoV** and **SARS-CoV-2 (COVID-19)**. This certification attests to the antiviral capacity of the WIVActive system to act on the digestion and reduction of the Betacoronavirus thanks to free radicals generated by the photocatalytic system activated with visible light with a calibrated spectrum.

Virus	Concentration	Time	Reduction %
Coronavirus	400 µl	0-4 h	-99,9%

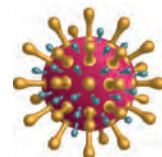
Bacteria

The antibacterial certification obtained by **wivactive technology** is based on the analysis of the bacterium Escherichia Coli, a microorganism belonging to enterobacteria (Enterobacteriaceae family), so called because they find their habitat ideal in the intestines of humans and various other animals. This bacterium was used by the Eurofins laboratory because it results be one of the most resistant and dimensionally important to verify the effective antibacterial action of the system **wivactive**.

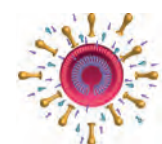
Microrganism	Concentration	Time	Reduction %
Escherichia Coli K12	1.5 – 5.0 x10 ⁷ cfu/ml	0-4 h	-99,14%

Example of killing coronavirus

Virus intact



Proteins and glycoproteins degraded

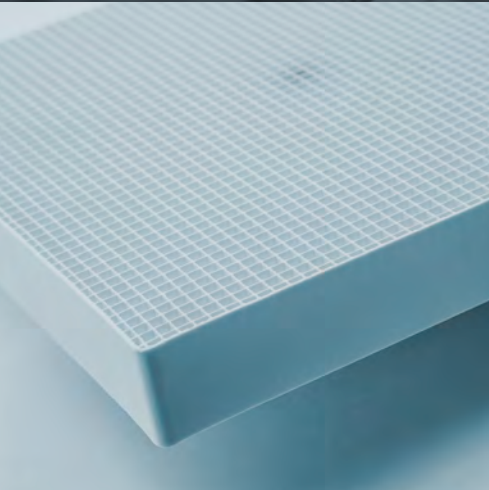


Virus capsid degraded



Virus inactivated





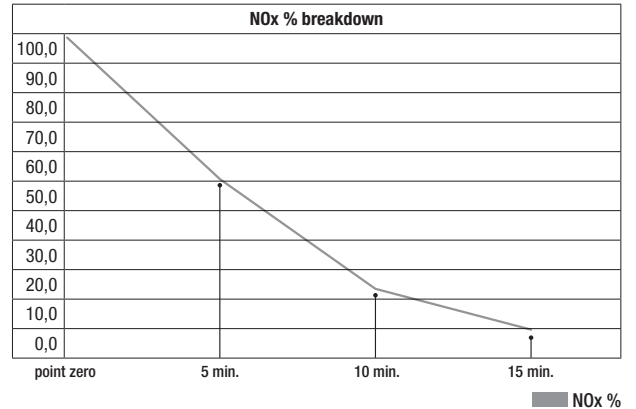
Indoor pollutants

The substances capable of altering the quality of the indoor air can be classified as: chemical, physical and organic agents; they come in part from the outside (outdoor air pollution, pollen), but many are produced from the internal sources. The main internal sources of pollution are represented by occupants of the rooms, dust (receptacle for microorganisms), structures, building materials, furnishings and air conditioning systems. The chemical risk is mainly linked to the presence in the indoor air of the following chemical pollutants such as oxides of nitrogen, airborne particulate matter, volatile organic compounds and formaldehyde. The certifications obtained by the **wivactive** system demonstrate the effectiveness of our technology and products.

Pollutants produced by:

Furnishings	Glues	Carpets and moquette
Paints	Detergents	Spray cosmetics
Solvents	Liquid waxes	Insecticides
Sealents	Spray and hygiene products	Soaps

	NOx ppm % Conc.	NOx % trend
point zero	103	100,0
5 min.	56	64,0
10 min.	27	26
15 min.	5	4,6

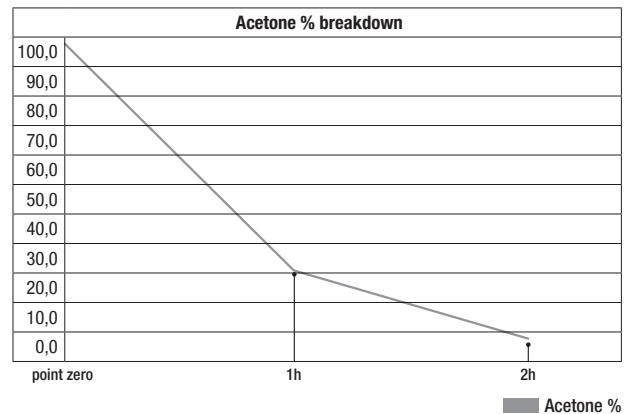


Nitrogen oxides (Harmful gas)

Caused by: combustion of internal combustion engines, air pollutants.

Cause: aggravates asthma, respiratory and cardiac diseases, increased susceptibility of lung infections, among the main environmental pollutants.

	ACETONE ug/m³ Conc.	ACETONE % trend
point zero	1045,2	100,0
1h	337,5	32,3
2h	34,4	3,3
4h	-	-
8h	-	-
12h	-	-
24h	-	-

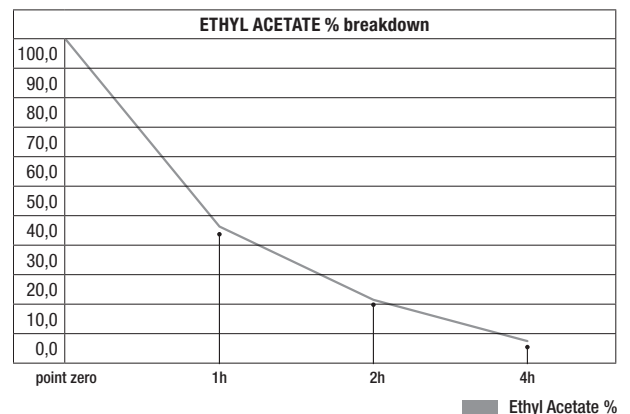


Acetone (Ketone group)

Found in: solvent, raw material in various organic syntheses

Cause: eye and respiratory irritation, mood swings and nausea, sleepiness, dizziness and exhaustion.

	ETHYL ACETATE ug / m3 conc.	ETHYL ACETATE % trend
point zero	1810,6	100,0
1h	780,2	43,1
2h	290,7	16,1
4h	-	-
8h	-	-
12h	-	-
24h	-	-

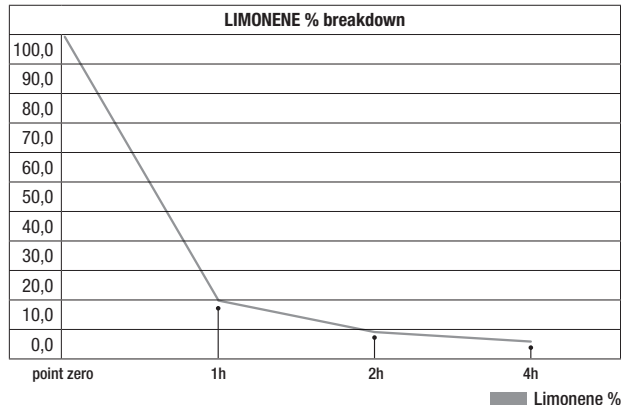


Ethyl Acetate (Foreign group)

Found in: solvent used for coffee production, restoration.

Cause: temporary corneal irritation and damage, dermatitis and eczema, lung irritation, liver damage, anemia.

	LIMONENE ug/m3 conc.	LIMONENE % trend
point zero	2052,0	100,0
1h	406,1	19,8
2h	87,5	4,3
4h	62,7	3,1
8h	-	-
12h	-	-
24h	-	-

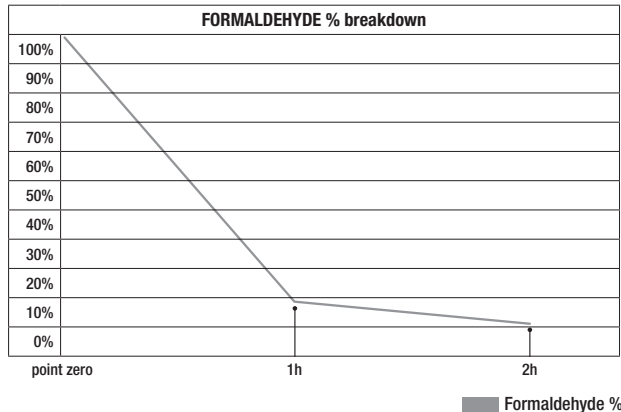


Limonene (Aromatic hydrocarbons group)

Found in: cosmetics product, toothpastes.

Cause: not harmful but useful for hydrocarbon concentrations control.

	FORMALDEHYDE ug/m3 conc.	FORMALDEHYDE % trend
point zero	244,0	100,0
1h	32,0	13,1
2h	20,0	8,2
4h	-	-
8h	-	-
12h	-	-
24h	-	-



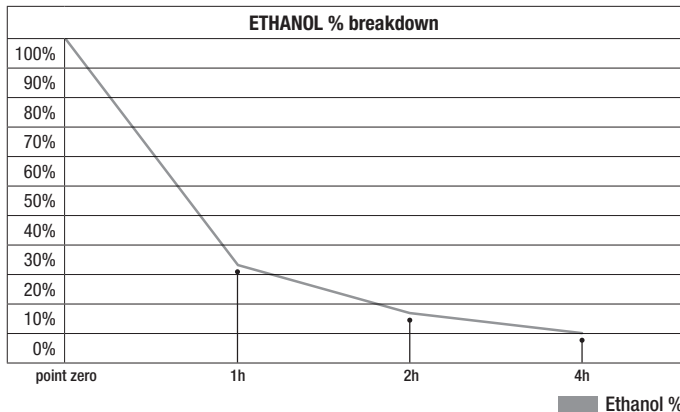
Formaldehyde (Aldehydes group)

Found in: compound products with plywood

Cause: nasal, ocular and throat irritation, skin rash.

Since 2004 indicated by the IARC as group I (carcinogen), unit of reference for the Sick Building Syndrome (SBS).

	ETHANOL ug/m3 conc.	ETHANOL % trend
point zero	1019,0	100,0
1h	274,8	27,0
2h	178,5	17,5
4h	73,0	7,2
8h	-	-
12h	-	-
24h	-	-



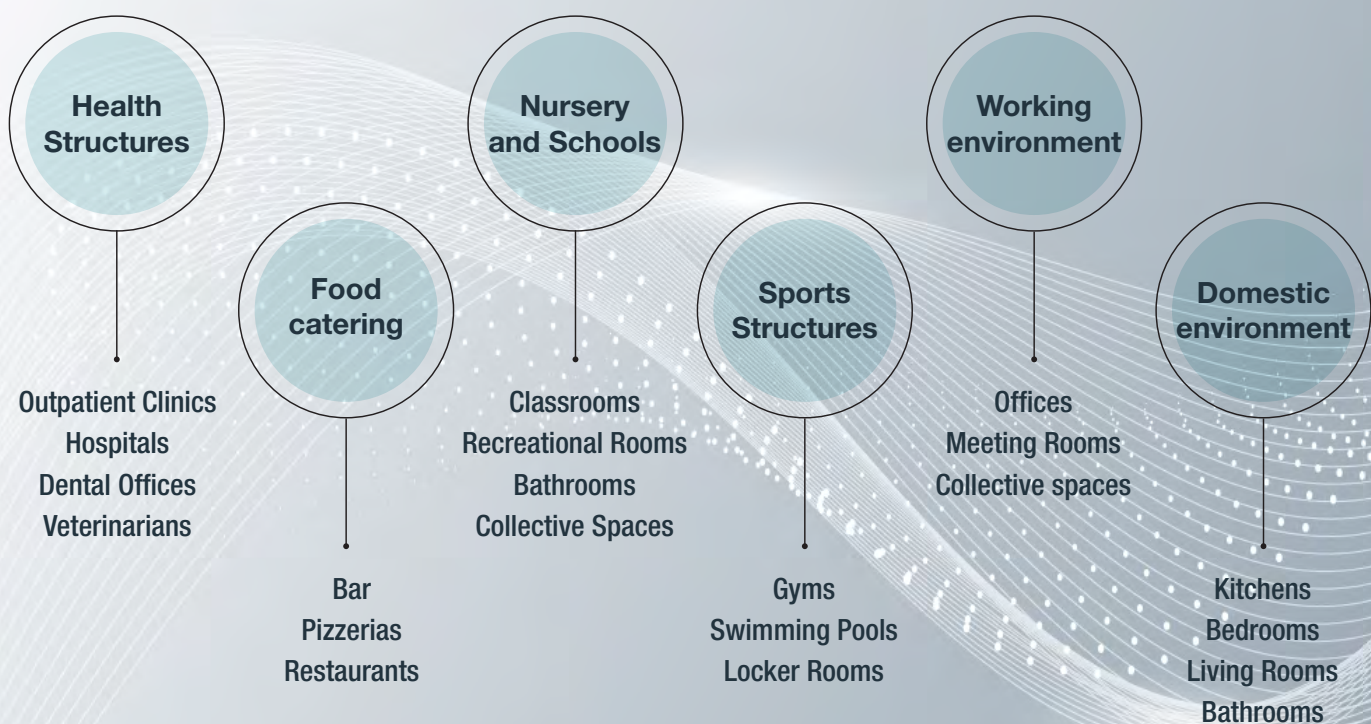
Ethanol (Alcohol group)

Found in: natural resin solvent, paint preparation.

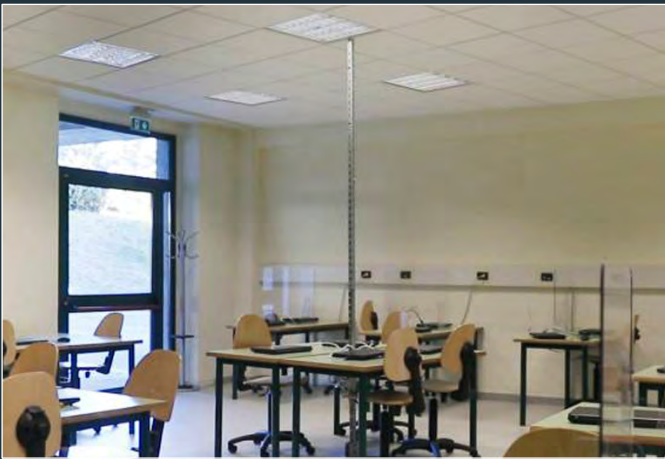
Cause: irritating to eyes and respiratory tract, easily flammable, effects for central nervous system.

Some **installation suggestions**

Products with **wivactive technology** are the ideal solution for sanitizing indoor environments. Whatever the intended use, **wivactive products** fulfill every type of need relating to the healthiness of the air, improving people's health.

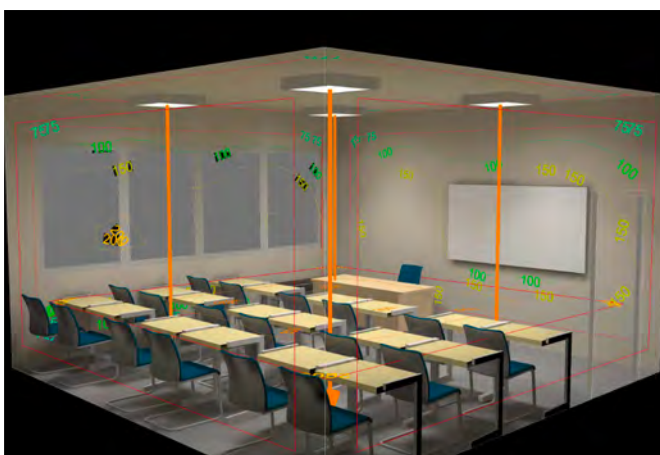


Safe environments and **sanitized air!**
Systems designed for every space and sized
for multiple volumes, **safe for all needs.**
H24 sanitized air for everyone.



Designing sanitation

The **wivactive** technology, with its dedicated products, finds its maximum functional and application effectiveness by following all the design phases that the **witek technical department** develops for each individual project. This fundamental activity is absolutely essential for those projects dedicated to companies and integration activities in professional environments. The projects are followed and elaborated by presenting the customer with the ideal solution in terms of effectiveness and investment, constantly putting himself by their side to manage all the design and installation aspects.



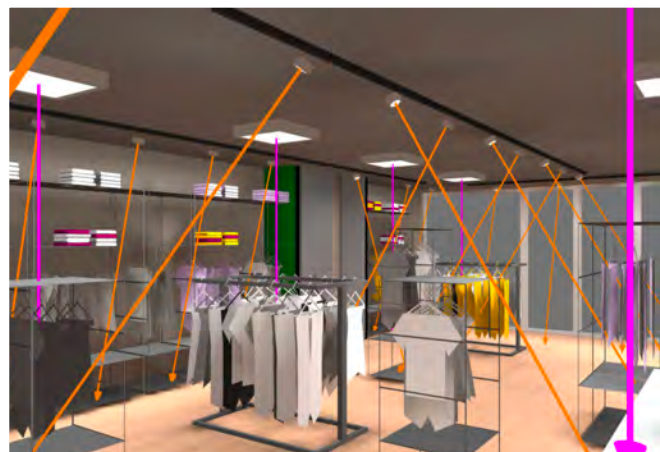
Project input:

Dimensions of the rooms

Environmental status analysis

People present in the rooms

Residence time



STRENGTHS



100% ANTIBACTERIAL

Thanks to the patented treatment based on doped titanium dioxide, **wivactive** products are 100% antibacterial and safe for public use.



TESTED ON SARS COV

Tests carried out by accredited laboratories have resulted in the certifications on which the effectiveness of **wivactive** products is based.



EASY INSTALLATION

The **wivactive** products feature ease of assembly, both those with lighting characteristics and the stand-alone ones.



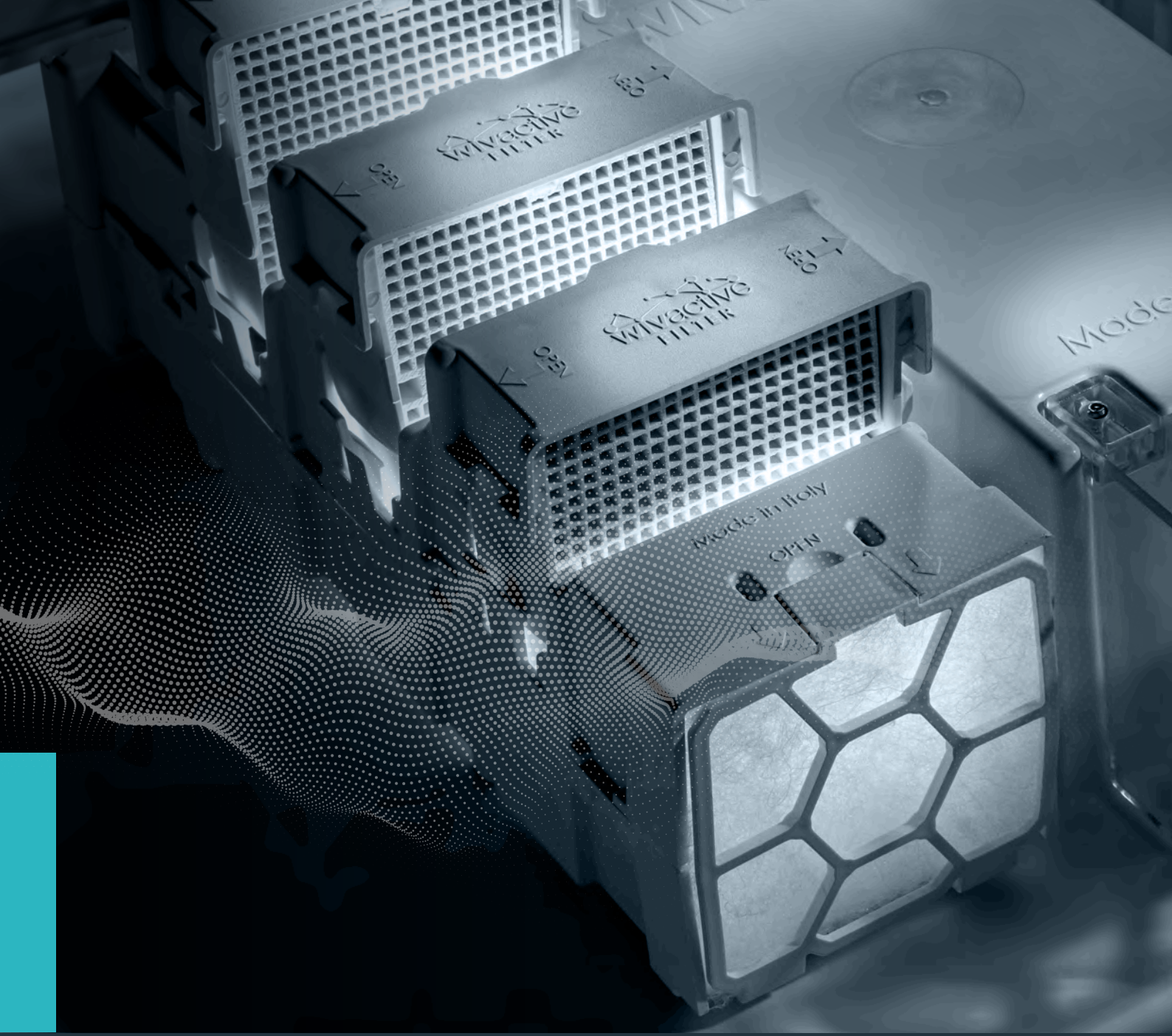
CUSTOM & PROJECT

The **wivactive** products, due to their design nature, can be customized to fully integrate them into any type of installation.



EASY TO CLEAN

The **wivactive** products are characterized by the ease and simplicity of maintenance that can be carried out independently.



VIMALUX

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