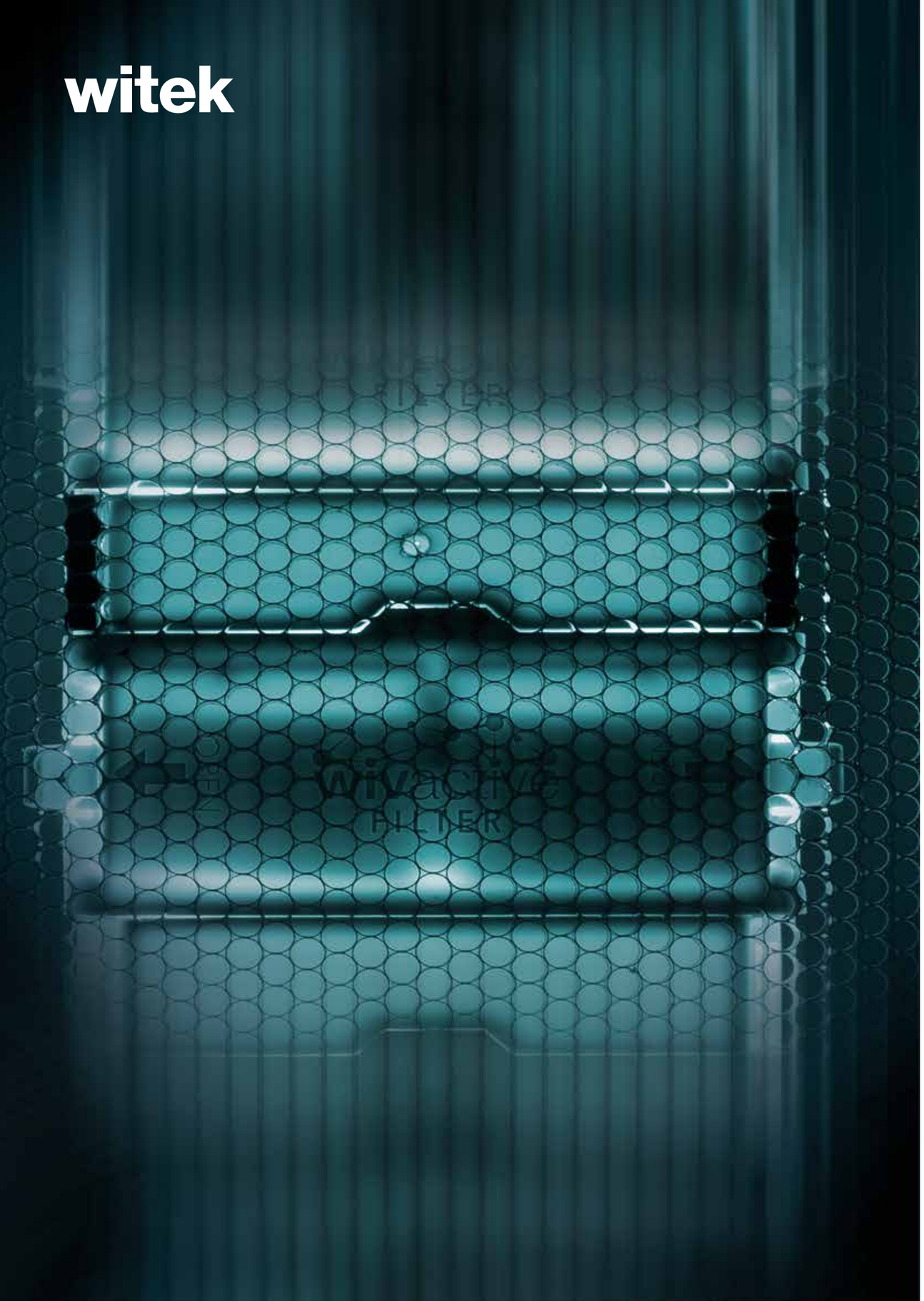
english version 4.0

wivactive
TECHNOLOGY

witek



witek

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.

INDEX

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 hat 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

Pollutants can be classified into chemical, physical and biological agents. Chemical pollutants include a number of natural or artificial substances which, present in the air in liquid, solid or gaseous form, worsen its quality. They can originate from sources located in the rooms themselves or come from the outside air, especially in conditions of high environmental pollution. The main **chemical contaminants** deriving from the outside include combustion gases (nitrogen dioxide, sulfur dioxide, carbon monoxide), ozone, airborne particulate, benzene, while those deriving from the confined environment are above all formaldehyde, volatile organic compounds, polycyclic aromatic hydrocarbons, substances present in environmental tobacco smoke, pesticides, asbestos and combustion gases. The main sources of **microbiological pollution** in the premises are represented by the occupants (humans, animals, plants), dust (receptacle for microorganisms), structures and building services. Hence the **SBS**, **Sick Building Syndrom**, which in recent years has been taking on a negative value with regard to the numerous pathologies that this develops. Combined exposure to ozone, environmental organic solvents and PM 2.5 even at low doses in indoor environments, constitutes a real risk for the physical and psychological integrity of people. The interaction between nox and vocs, heavy metals and oxidants with secondary reactive substances, cause oxidative stress at the neuronal and immune level.

The safe solution against viruses and bacteria

Patented and certified technology for indoor air sanitation

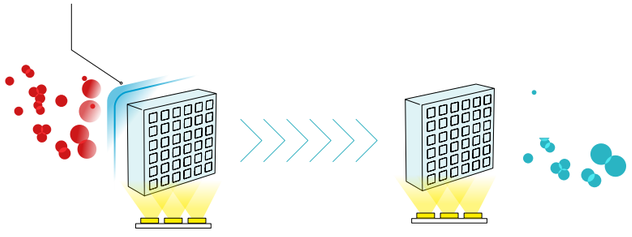
What is wivactive technology

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) is activated by visible light generated by a special LED board calibrated on a particular visible light wavelength which thus triggers the oxidative photocatalysis process. The nanotechnological 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 TiO_2 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.

NO UV LIGHT

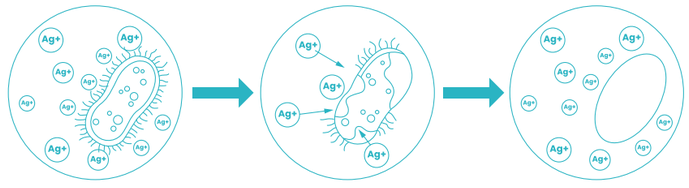
NO OZONE

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 Ag+

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.



Nanoparticles (AgNPs) release silver ions (Ag+)

Ag+ is absorbed by the pathogens

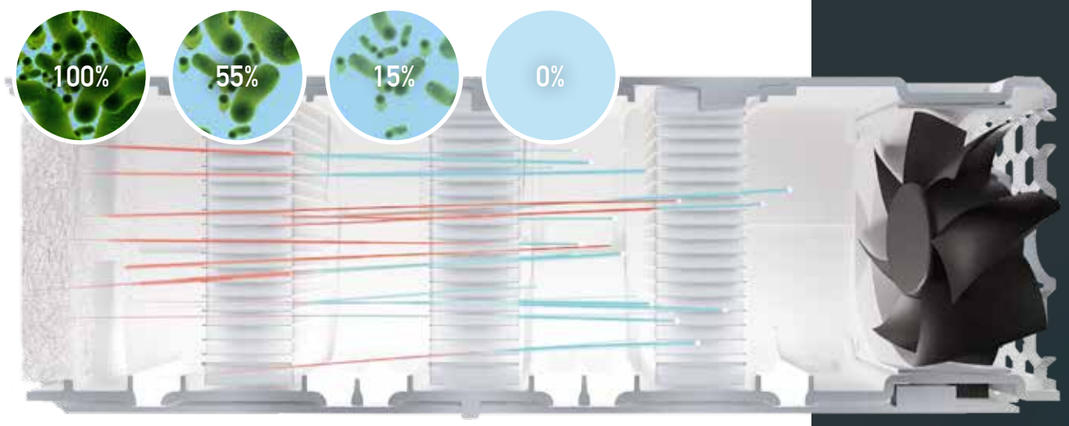
Ag+ inhibits cell division and replication of the pathogens

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 mm²

HIGH POROSITY CERAMIC FILTER

SUBSTANCES ELIMINATED FROM THE WIVACTIVE SYSTEM

Virus | **Germs** | **Bacteria** | VOCs | NOx | Unpleasent smells | Spores & Pollen

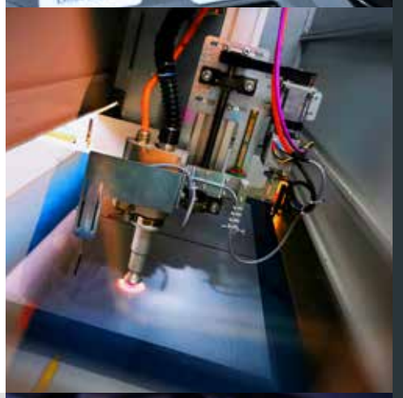
Research
& development

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 Nonotechnology 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.

IFAC CNR
Institute of Applied Physics - National Research Council

IFAC 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 truthfulness on the certifications obtained by independent certified Italian and foreign 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

The **wivactive** ceramic filters have a coating based on Titanium Dioxide (TiO2) doped with Nitrogen (N) and other chemical elements subject to secrecy and patent. The wivactive nanotechnological material has reduced the energy level Eg = 2.7eV-2.9eV and therefore is able to activate at lower energy levels, thus being able to exploit even visible wavelengths significantly.

Exclusive patent on the production process

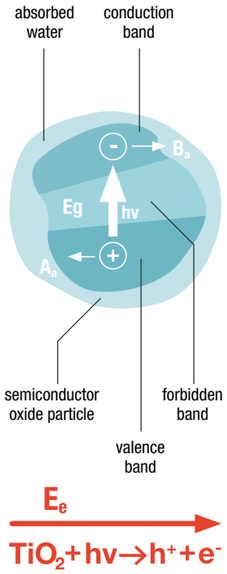
Having the possibility of making a nanoparticle-based coating process reproducible and therefore stable is a very demanding job. The coating and surface softening by means of an oven allows a secure fixing of the nanocomposite to the support.

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

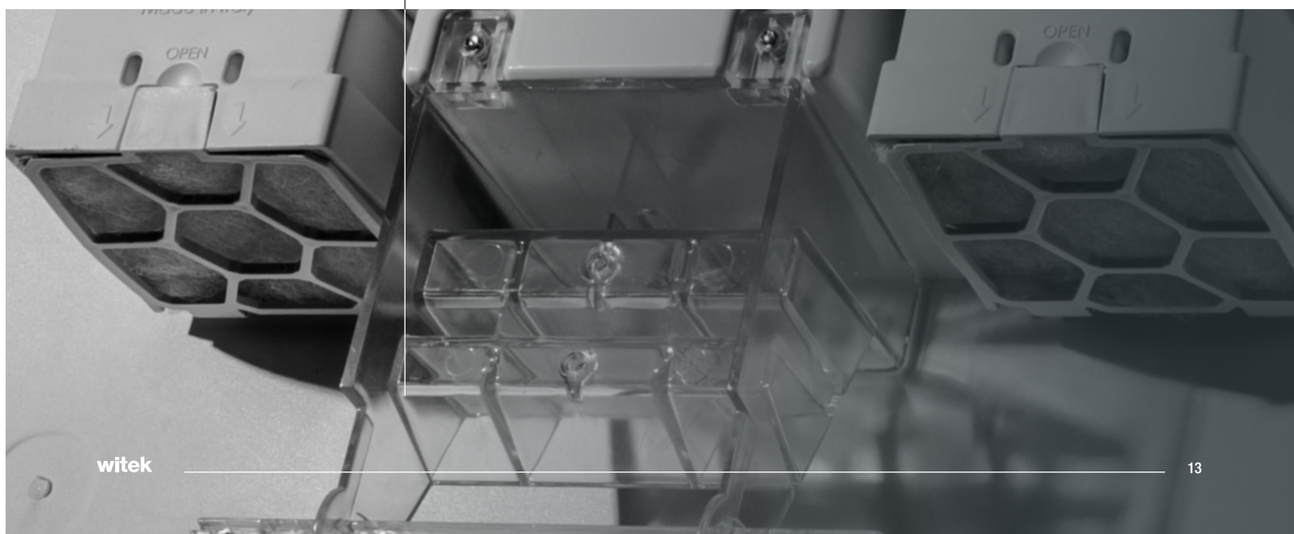
The know-how acquired in the lighting field for over 20 years has made it possible to develop a spectrum **LED light scheme calibrated** on customized frequencies in order to obtain maximum effectiveness in terms of activation of the nanomaterials present in the **wivactive** system.



LED board

Study and research

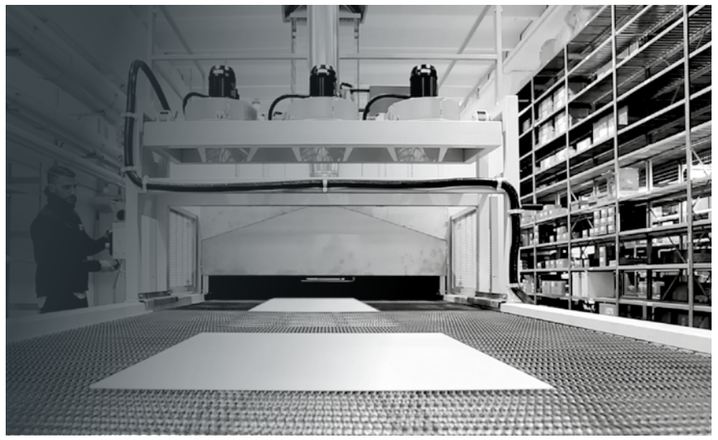
The research carried out by **WITEK**, in partnership with CE.RI.COL., Led to the development of a unique nanomaterial of its kind, a TiO2 doped with nitrogen and with silver nanoparticles combined with particular chemical elements. use of UV for the execution of the photocatalysis process. The silver nanoparticles and doped TiO2 react with the water molecules present in the air, releasing free radicals and silver ions capable of oxidizing most of the organic VOC contaminants, breaking down nitrogen oxides (NOx) and also controlling and reduce the bacterial and viral load. All this without the creation of ozone and the use of light radiation such as 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 ISTEC 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 phase2**
6. **Heating phase3**
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.

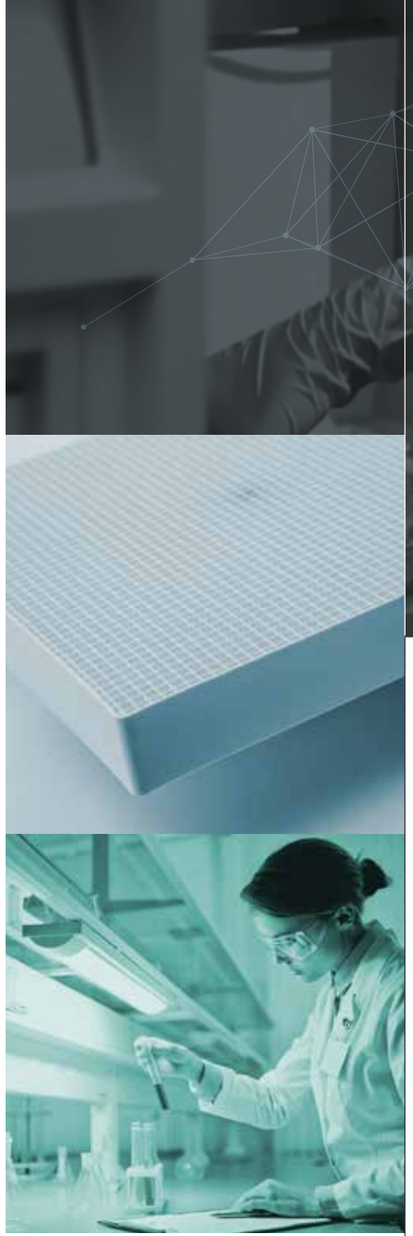
Virus	Concentration	Time	Reduction %
Coronavirus	400 µl	0-4 h	-99,9%

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 x107 cfu/ml	0-4 h	-99,14%

Example of killing coronavirus



Indoor pollutants

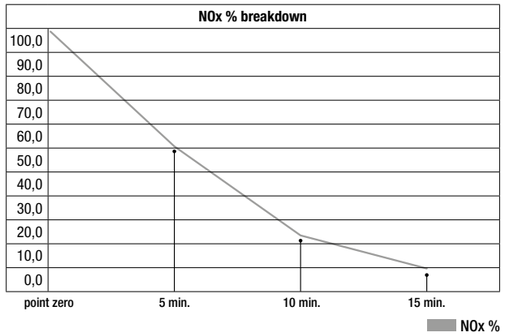
The substances capable of altering the quality of the indoor air can be classified as: chemical, physical and organic agents; they come in part from the outside (outdoor air pollution, pollen), but many are produced from the internal sources. The main internal sources of pollution are represented by 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

CE.RI.COL

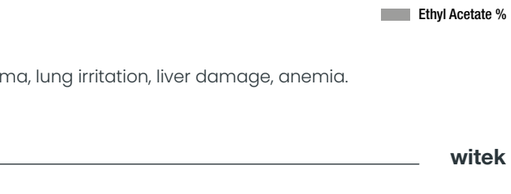
	NOx ppm % Conc.	NOx % trend
point zero	103	100,0
5 min.	56	64,0
10 min.	27	26
15 min.	5	4,6



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.

BIOCHEMIE lab
competenza italiana nel settore analisi

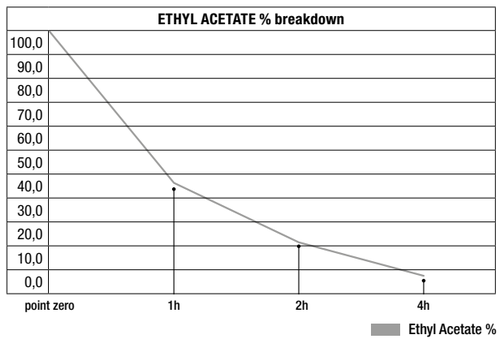
	ACETONE ug/m³ Conc.	ACETONE % trend
point zero	1045,2	100,0
1h	337,5	32,3
2h	34,4	3,3
4h	-	-
8h	-	-
12h	-	-
24h	-	-



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.

BIOCHEMIE lab
competenza italiana nel settore analisi

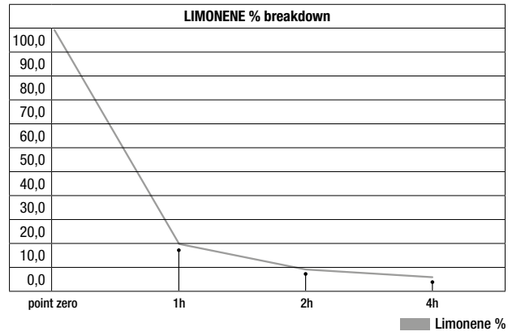
	ETHYL ACETATE ug / m3 conc.	ETHYL ACETATE % trend
point zero	1810,6	100,0
1h	780,2	43,1
2h	290,7	16,1
4h	-	-
8h	-	-
12h	-	-
24h	-	-



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.

BIOCHEMIE lab
competenza italiana nel settore analisi

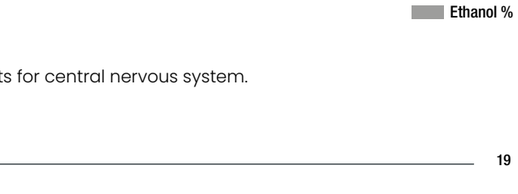
	LIMONENE ug/m3 conc.	LIMONENE % trend
point zero	2052,0	100,0
1h	406,1	19,8
2h	87,5	4,3
4h	62,7	3,1
8h	-	-
12h	-	-
24h	-	-



Limonene (Aromatic hydrocarbons group)
Found in: cosmetics product, toothpastes.
Cause: not harmful but useful for hydrocarbon concentrations control.

BIOCHEMIE lab
competenza italiana nel settore analisi

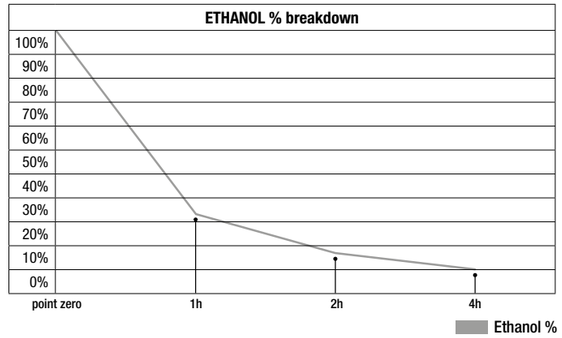
	FORMALDEHYDE ug/m3 conc.	FORMALDEHYDE % trend
point zero	244,0	100,0
1h	32,0	13,1
2h	20,0	8,2
4h	-	-
8h	-	-
12h	-	-
24h	-	-



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).

BIOCHEMIE lab
competenza italiana nel settore analisi

	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.

Health Structures
- Outpatient Clinics
- Hospitals
- Dental Offices
- Veterinarians

Food catering
- Bar
- Pizzerias
- Restaurants

Nursery and Schools
- Classrooms
- Recreational Rooms
- Bathrooms
- Collective Spaces

Sports Structures
- Gyms
- Swimming Pools
- Locker Rooms

Working environment
- Offices
- Meeting Rooms
- Collective spaces

Domestic environment
- Kitchens
- Bedrooms
- Living Rooms
- Bathrooms

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

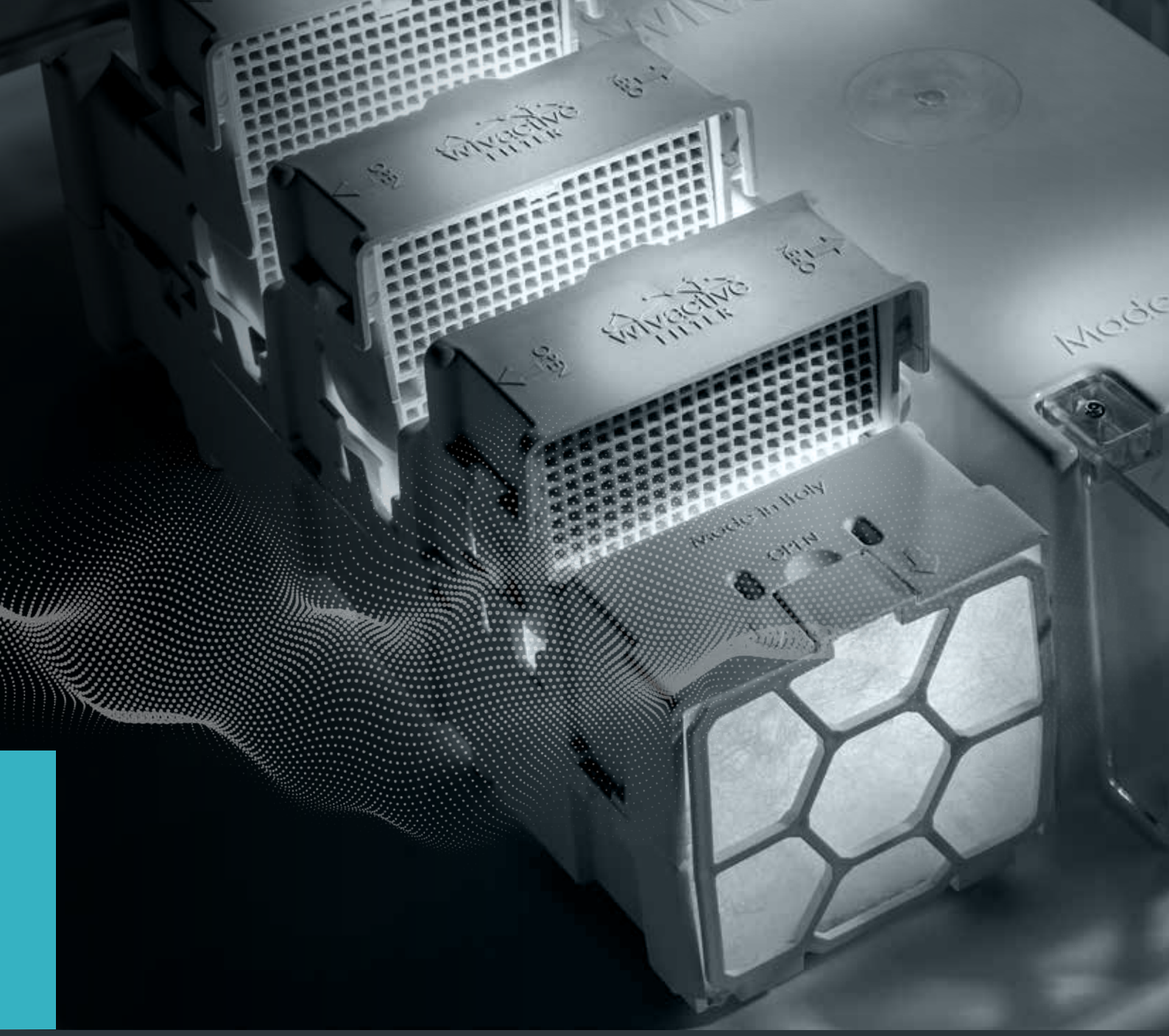
The **wivactive** products feature ease of assembly, both those with lighting characteristics and the stand-alone ones.

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.



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