NATURAL PROTECTIVE SHIELD

The permanent solution for biosecurity in the healthcare sector

MEDICAL DEVICE CLASS 1

MEDICAL DEVICE

Approved by the Ministero della Salute (Italian Ministry of Health)

According to Directive 93/42/EC - Medical Device Class 1

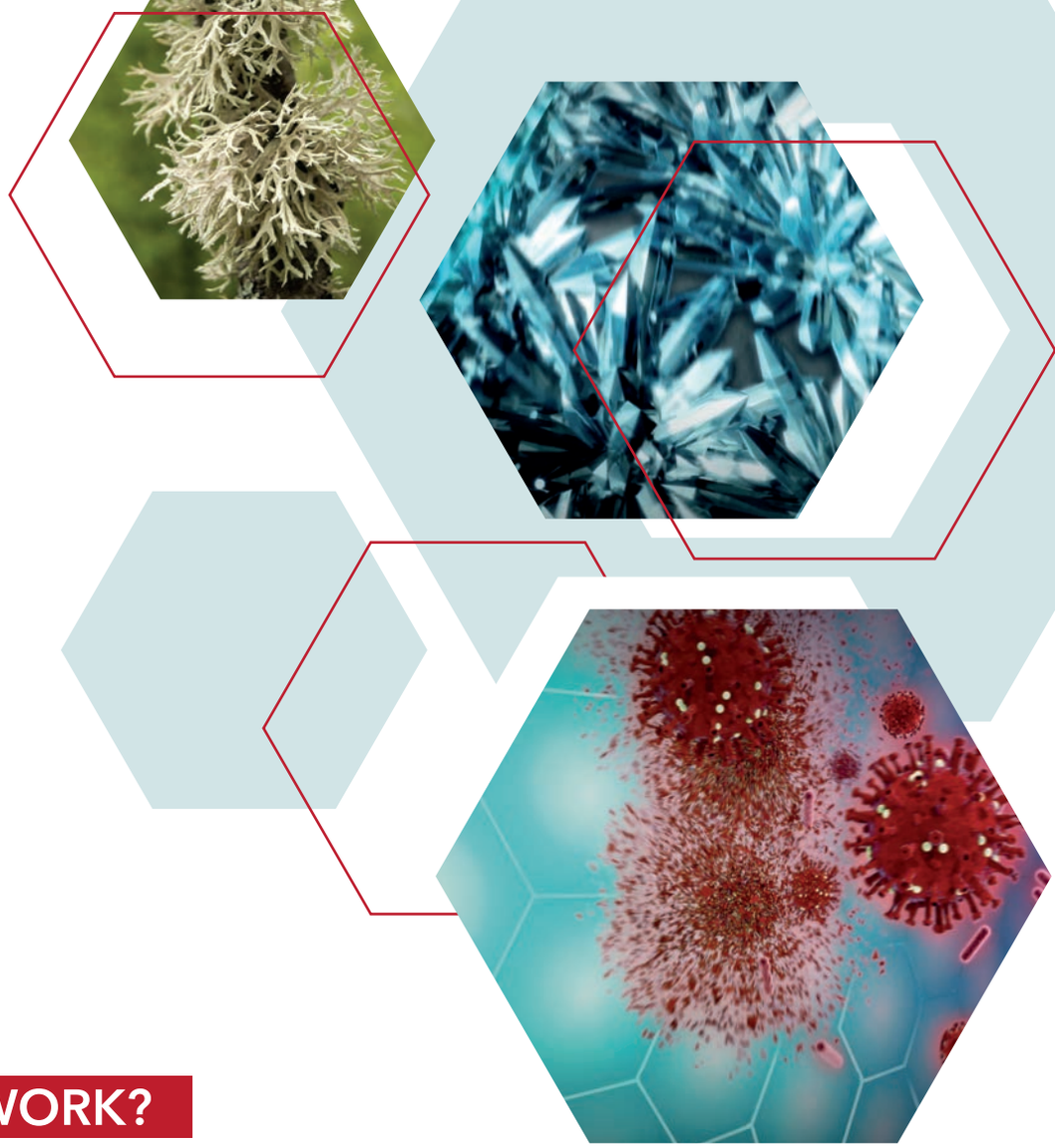

HS 360
HYDRO SHIELD 360° OF PROTECTION
NPS Outdoor
Natural Protective Shield™
SOLUZIONE AD ATTIVITÀ
250 ml
È UN DISPOSITIVO MEDICO
NPS Fast
Natural Protective Shield™
SOLUZIONE AD ATTIVITÀ ANTIPROLIFERATIVA IN 24 ORE
250 ml
RAPPORTO DI UTILIZZO: 3,0% v/v
È UN DISPOSITIVO MEDICO
NPS Indoor
Natural Protective Shield™
SOLUZIONE AD ATTIVITÀ ANTIPROLIFERATIVA IN 48 ORE
250 ml
RAPPORTO DI UTILIZZO: 3,0% v/v
È UN DISPOSITIVO MEDICO

WHAT IS NPS

Natural Protective Shield™ (NPS™), is the **patented** system behind the technology developed by Vestatis.

The application provides **permanent protection of the surfaces of our living environment** against microbiological contamination and the risk of indirect transmission of pathogens to humans.

The invention, which is protected by an international patent application (PCT), results from the research activity of the Italian research team of **Vestatis GmbH** and has led to the development of a range of products for surface protection.



HOW DOES IT WORK?

Our invention is based on the discovery that embedding a **molecule of natural origin** in a polymer matrix gives the treated surface self-disinfecting properties and reduces its microbiological load.

This property is a result of the specific mechanical action of the molecule, which **crystallises in the polymer matrix after application to the surface, forming a protective barrier** that prevents adhesion and thus microbial colonisation.

NPS™ technology is completely non-toxic to humans and environmentally friendly.

This shield allows to **maintain the level of surface "contamination" at levels close to zero permanently**, with measurable results, guaranteed for 3 years.

ADVANTAGES

NATURAL PROTECTIVE SHIELD

- Simple to use on any surface
- 24/7 — Active for 24 hours a day, 7 days a week
- 36 MONTHS — Effectiveness guaranteed for 36 months
- Suitable for all types of surfaces
- Effective against microbial proliferation
- Effective against viruses
- Suitable for use in the medical and healthcare sector
- Facilitates hygiene and simplifies cleaning
- Reduced maintenance costs
- Environmentally safe

Care-associated infections are a common and **serious complication in healthcare** and can occur in any care setting, e.g. hospitals, clinics, nursing homes, doctors' offices, consulting rooms, dental practices, rehabilitation centres, diagnostic centres and clinical testing laboratories.

In addition to the **significant impact on human health**, they also cause very high economic costs and therefore represent a real challenge for the management of health facilities.

Natural Protective Shield™ consists of a range of **innovative products** specifically designed to provide **long-lasting protection against microbiological contamination.**

Unfortunately, certain **pathogenic microorganisms are the main causes of patient infections and triggers of nosocomial diseases today.** These linger on surfaces if disinfection is not carried out properly and pose a **health risk to patients**.

Viruses, bacteria and **fungi** **can remain active on surfaces** - from walls and floors to work surfaces and furniture - for a long time. These surfaces are a breeding ground for microorganisms, promote the transmission of pathogens and **increase the risk of contamination** through direct contact.

An effective and long-lasting solution to the problem of sanitising surfaces in healthcare environments

Numerous studies show that **pathogenic microorganisms can survive disinfection under certain conditions**. In general, the factors that can influence the ability of bacteria to survive on surfaces are as follows:

- **Biological characteristics of the micro-organism:** Some microbial species are naturally more resistant than others.
- **Temperature and humidity:** Low temperatures and air humidity above 70% favour the persistence of numerous micro-organisms on surfaces.
- **Organic material:** The presence of blood, secretions and/or other body fluids is associated with increased persistence of bacteria on surfaces.
- **Bacterial load:** There is a direct correlation between the number of bacteria on surfaces and their survival. The more bacteria present, the longer they can survive on the surface.

In addition, **recent studies have shown that the viral parts of some viruses, such as the coronavirus, are still capable of causing infection several days after they have settled on the surface.**

How long does a microbe remain on the surface?

SURFACE	EXAMPLE	DAYS
METAL	Door and window handles	Up to 5 days
GLASS	Doors and windows	Up to 5 days
CERAMICS	Washbasins and toilets	Up to 5 days
WOOD	Desks and cabinets	2-3 days
PLASTIC	Hospital bed heads	2-3 days
STAINLESS STEEL	Beds and stretchers	2-3 days
FABRIC	Seating in general (chairs armchairs, sofas)	2-3 days

To reduce the risk, it is therefore particularly important to carry out appropriate disinfection operations aimed at reducing the microbial load on any surface that may come into contact with people.

NATURAL PROTECTIVE SHIELD

The natural shield against microbial proliferation

Healthcare disinfection procedures aim to prevent the proliferation of microorganisms, especially resistant germs. In fact, in all environments there is a group of microbial cells that **form a biofilm** of different biological components **in their defence to survive adverse conditions.**

The formation of a biofilm begins with a process of adhesion of microorganisms to a surface. Subsequently, the biofilm grows through cell divisions and the invasion of external bacteria.

Biofilms can form on any type of surface. Their envelope, which consists of mucopolysaccharides, acts as protection by preventing the penetration of disinfectants.

In this way, the biofilm forms a barrier to the action of many biocides and prevents the complete elimination of microorganisms. Surviving microorganisms remain, which germinate again and form residences against the active substances.

Based on experimental evidence, the disinfection of surfaces and the use of disinfectants is recommended in all international guidelines, which in itself is an important procedure to prevent infections. These procedures usually use **chemical disinfectants,** which pose risks to the environment and user **safety.** Moreover, chemical disinfectants can be more or less effective depending on the microorganism, leading to a very critical outcome.

The current adaptability of microorganisms, shows that **increasing bacterial resistance to all biocides can be observed in nosocomial environments.**

Natural Protective Shield™ provides near-instant **reduction of pathogens, offering immediate**, lasting, around-the-clock protection **FOR AT LEAST 36 MONTHS**

The natural molecule on which the NPS™ products are based is **safe for humans and the environment** and is not subject to loss of efficacy due to its unique mechanical mechanism of action. Thanks to its ability to act as a "**protective shield**", **the innovative NPS™ technology significantly limits the risk of transmission of multi-resistant microorganisms.**

When Natural Protective Shield™ coatings are applied to the infested surface, they form a dense **crystal layer** that does not allow microbial adhesion and punctures the cell membrane of the microorganisms present, resulting in a reduction of microbial infestation.

Due to their effectiveness as a mechanical barrier, **NPS™ products are registered as Class I medical devices** for the protection of healthcare facilities.

In healthcare facilities, the use of NPS (Natural Protective Shield™) treatment is recommended for all surfaces.

Vestatis recommends carrying out a **risk analysis** of the most vulnerable areas from which to start treatment. In this way, a safe "corridor" is created that is protected from microbial proliferation for a guaranteed 36 months.

According to the data collected, the areas most at risk are those where there are many people and where there is a greater volume of people between patients, visitors and staff (entrance halls, corridors, lifts, waiting rooms, rooms).

Vestatis has developed a range of products that meet all requirements and offer specific solutions depending on the environment and the type of surface to be treated.

READY-TO-USE PRODUCTS

Hydro Shield - HS360

A medical device specifically designed to biosecure healthcare environments thanks to its proven and durable antibacterial and antiviral efficacy.

Available in the form of a transparent polymer matrix, HS360 is ready to use and can be applied directly to any type of surface.

It has good transparency, excellent flow, dries quickly and has high surface hardness.

It withstands repeated cleaning cycles with non-aggressive, alcohol-free cleaning agents and retains its effectiveness.

PROFESSIONAL USAGE

- ONE-COMPONENT VARNISH
- LOW ENVIRONMENTAL IMPACT
- DOES NOT CONTAIN BIOCIDES
- CONTAINS NO SOLVENTS
- ODOURLESS
- EASY APPLICATION
- EXCELLENT METRIC YIELD

INSTRUCTIONS FOR USE

AREA OF APPLICATION: Suitable for protecting all types of surfaces.

YIELD: 1 litre covers an average of 10.5 m² of surface with one coat.

DILUTION: ready to use

PACKAGE: 3 litres

COLOUR: colourless

TECHNICAL NOTES

RESISTANCE: Against abrasion, scratches, temperature fluctuations

FINISH: glossy

USE: interior/exterior

APPLICATION: roller, brush, spray

AVERAGE CONSUMPTION (g/m²): 110

ADDITIVES FOR COATINGS SUITABLE FOR ANY MATERIAL

Natural Protective Shield™

Natural Product Shield™ is a range of medical products specifically designed to provide long-lasting protection against microbial contamination. NPS™ products have a paste-like consistency and can be easily added to most coating media for all types of surfaces. When added to polymer matrices, NPS™ products have a disinfecting effect that preserves the treated surface.

- SINGLE-COMPONENT
- LOW ENVIRONMENTAL IMPACT
- DOES NOT CONTAIN BIOCIDES
- CONTAINS NO SOLVENTS
- ODOURLESS
- PRACTICAL TO USE, THANKS TO THE DOSING TIPS
- HIGHLY CONCENTRATED
- EASILY DISPERSED
- VERSATILE

INSTRUCTIONS FOR USE

AREA OF USE: suitable for all types of polymer matrices

CONSUMPTION PER BASE QUANTITY: 30 ml per litre

PACKAGE: 250 ml

TECHNICAL INFORMATION

SHELF LIFE AND STORAGE (in unopened original containers in a cool, dry place): 12 months

NPS™ Fast

The NPS™ fast formulation is designed to work within 24 hours and is particularly suitable for protecting all small surfaces such as door and window handles, chairs, armchairs, desks and furniture in general.

NPS™ Outdoor

FOR EFFECTIVE AND LONG-LASTING PROTECTION OF OUTDOOR SURFACES

Outdoor surfaces are normally subject to weathering and atmospheric pollutants. The formulation of NPS™ Outdoor is designed to resist UV light, rain, temperature changes and pollution. It is water repellent and breathable.

NPS™ Indoor

FOR EFFECTIVE AND DURABLE PROTECTION OF INTERIOR SURFACES.

Indoor floors and walls are typically subject to impact and scratches.

The formulation of NPS™ Indoor has been specifically designed to resist scratches and other damage caused by foot traffic.

PRACTICAL CASES

HOSPITALIZATION ROOMS

Patient rooms are enclosed spaces where people suffering from various diseases stay for a long period of time. In such an environment, it is strongly recommended to apply the product to walls, floors and windows, as well as to all other surfaces such as work surfaces and seating that may come into contact with patients, healthcare workers and visitors.

DENTAL CLINIC

A dental office is usually a closed facility with low air circulation, equipped with few work surfaces and a treatment chair in the centre. In these rooms, it is recommended to apply the coating to all areas such as the sink, the furniture and the upholstery of the treatment chair.

MEDICAL TRANSPORT VEHICLES

Medical transport vehicles can be the source of contamination and should therefore be considered a medical environment. To ensure a safe rescue service with regard to the risk of infection, it is necessary to disinfect the surfaces. In this case, it is recommended to apply the product to the floor and all other surfaces, including all handles of the medical vehicle.

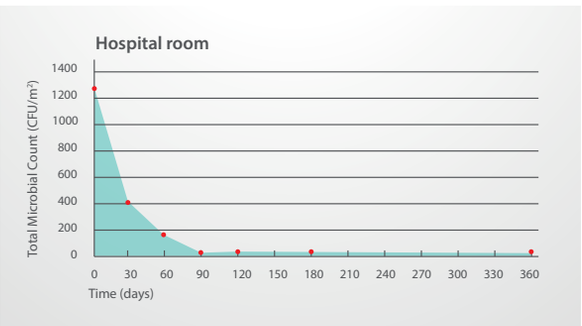
PAEDIATRIC CLINIC

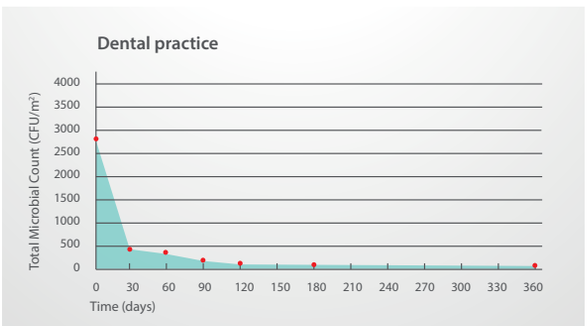
A paediatric practice is a closed environment, usually consisting of a waiting room and examination rooms. It is necessary to disinfect all surfaces that may become contaminated during access even by apparently healthy patients. In this case, it is advisable to apply the product to all surfaces that are most frequently touched, such as work surfaces, door and window handles, light switches and seating in the waiting room.

CASE HISTORY

Vestatis verified the effectiveness of its treatment with the NPS line of medical devices in **real-life** settings, i.e. during regular and continuous activity. To this end, experimental studies were conducted in collaboration with a public hospital and two established clinics, in which the **presence of microbiological contaminants on surfaces was monitored** for over a year.

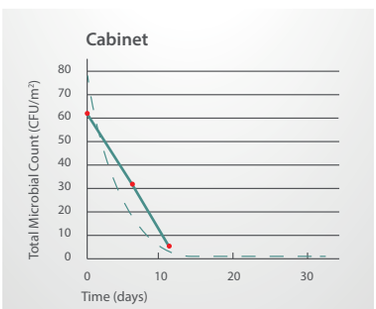
Here are the results.



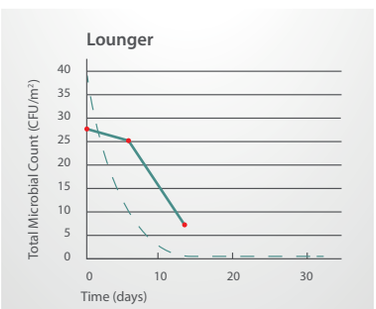


Measurement of bacterial load trends on the walls of the patient room of a hospital and a dental practice, following the ISO 18593 protocol "Horizontal methods for surface sampling". The values represent the average data of the microbial count carried out by taking swabs with contact plates (Contact Slide) at precise and mapped points in the treated rooms. The initial time is the average microbial count measured before treatment.

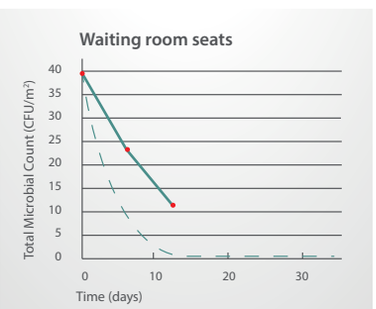
Laminate cabinet treated with specific transparent coating with 3% NPS additive INDOOR



Synthetic leather sun lounger treated with gentle cream for fine leathers with 3% NPS additive INDOOR



Waiting room seating treated with a specific enamel for plastic materials with 3% NPS INDOOR additive



Measurement of bacterial load trends on the surfaces of various pieces of furniture in a private clinic, according to following the ISO 18593 protocol "Horizontal methods for surface sampling". The measurement of the microbial load was carried out with the bioluminometer, an instrument which allows an immediate quantification of the state of hygiene of the surface through the indirect analysis of the presence of ATP. The data is expressed in relative luminosity units (RLU).

CERTIFICATIONS

CLASS 1 MEDICAL DEVICE – each NPS product dedicated to healthcare facilities has been included in the public list of medical devices published on the Italian Ministry of Health portal. CND classification: T030599 - **PROTECTIONS FOR ROOMS PROVIDED FOR HEALTHCARE SERVICES.**

Registration IDs Disp. Med. NPS: 1966629, 2050128, 2050120, 2050121, 2050122, 2050123, 2050124, 2050125, 2050126, 2050127.

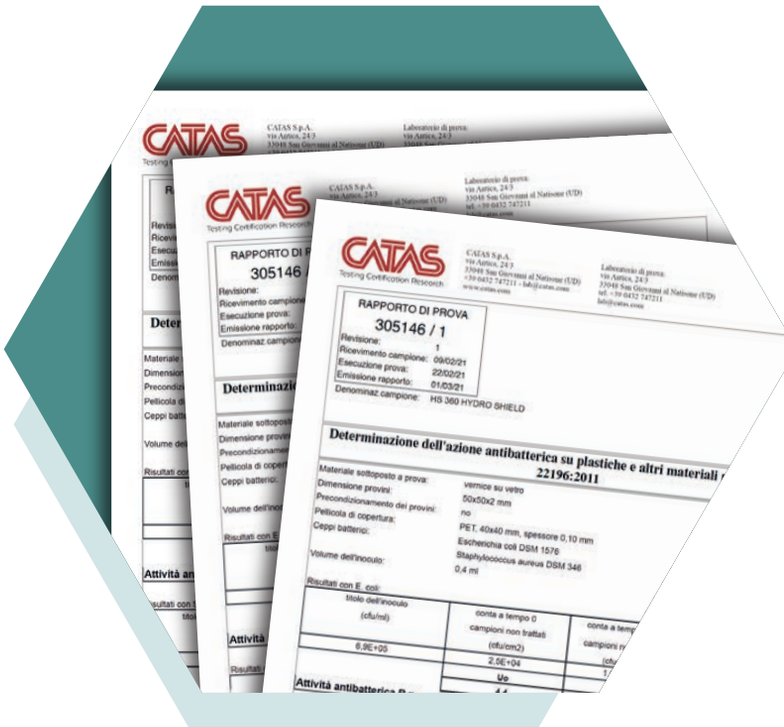
INTERNATIONAL PATENT APPLICATION (PCT) - Vestatis' technological invention, as well as the manufacturing process behind the Natural Protective Shield™ technology, are protected by an international PCT patent with global scope of protection.

ISO 22196:2011 "Measurement of antibacterial activity on plastics and other non-porous surfaces".

- Sample of surface treated with HS360 (3% NPS) and tested after 24 hours (t0) and Sample of surface treated with HS360 (+3% NPS) tested after 36 months of accelerated ageing (t36). Results certified by theo CATAS S.p.A. Laboratory accredited by Accredia (LAB N°0027L).
  - R(*Escherichia coli*) t0 = 2,3
  - R(*Escherichia coli)* t36 = 1,7
  - R(*Staphylococcus aureus*) t0 = 2,1
  - R(*Staphylococcus aureus*) t36 = 2,6
- Sample of a surface treated with HS360 (3% NPS) tested after 24 hours (t0) and sample of a surface treated with HS360 (+3% NPS) tested after 36 months of accelerated ageing (t36). The results were certified by the University of Brescia - Department of Molecular and Translational Medicine, Microbiology Division.
  - R(*Escherichia coli*) t0 = 4,3
  - R(*Escherichia coli*) t36 = 4,3
  - R(*Staphylococcus aureus*) t0 = 3,2
  - R(*Staphylococcus aureus*) t36 = 5,2

ISO 21702:2019 "Measurement of antiviral activity activity on plastics and other non-porous surfaces. porous surfaces".

- Tested virus: vacciniavirus. Surface sample treated with HS 360 (3% NPS). Results certified by the Merieux NutriSciencis Chelab S.r.l. laboratory.



- Tested virus: **Sars-CoV-2**. Surface sample treated with HS 360 (6% NPS). Results certified by the VIRHEALTH SAS Laboratory.

ANTIVIRAL ACTIVITY: in vitro investigation of mechanisms of action. NPS showed protease activity against the Sars-CoV-2 spike protein required in the mechanism of infection. The antiviral efficacy was tested in an in vitro experimental model where a culture of mammalian Vero E6 cells with ACE2 receptors was infected with Pseudocoronavirus (coronavirus inactive but exposing the Spike protein). The tests and results are by Laboratorio Microbo, a spinoff of La Sapienza University of Rome.

Technical characteristics of surfaces treated with NPS. Results certified by the CATAS S.p.A. Laboratory accredited by Accredia (LAB N°0027L)

- Resistance of the surfaces to scratching UNI EN 15185:2011
- Resistance of the surfaces to scratching UNI EN 15186:2012, met. B
- Resistance to temperature changes UNI 9429:2015
- Tendency to retain dirt UNI 9300:2020
- Assessing the effects of exposure to light UNI EN 15187:2007
- Resistance of surfaces to cold liquids UNI EN 12720:2013
- Resistance of surfaces to moisture heat UNI EN 12721:2013

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