

Project:

Self-Cleaning and Self-Sterilizing of ceramic tiles

Industry:

Tile Manufacturing

Product:

Water based nanotechnology suspension for Self-Cleaning and Self-Sterilizing tiles

Key Benefits:

- Self Cleaning
- Self Sterilizing
- Superhydrophilic
- Decomposes Odours
- Air purification
- Continuous Action
- Environmentally friendly cleaning technology

Applications:

- Self-Cleaning of ceramic surfaces
- Protection from organic stains
- Decomposes pollutants and protects the environment
- Bacterial and fungal growth inhibition
- Exhaust Gas Break-Down



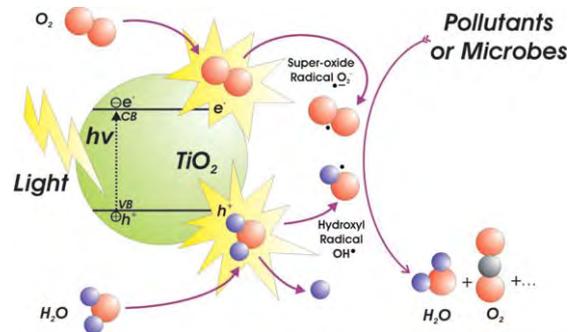
SurfaShield® T

Active Self-Cleaning Nanotechnology for the Protection of Tiles Surfaces

SurfaShield T is a nanotechnology based suspension especially designed for professional or industrial applications that can be easily applied on ceramic surfaces by spraying, without the need of energy consuming heat treatment steps. Nanoparticles chemically bond on the tile surface and assure Class III abrasion resistance. By harnessing the surrounding light (natural or artificial), SurfaShield T modified tiles become active: They decompose organic material and deactivate any living microorganism. SurfaShield coated surfaces can efficiently eliminate organic stains, bacteria, fungi, gaseous pollutants, even odours. SurfaShield T modified surfaces are safer, without the use of hazardous chemicals or disinfectants.



SurfaShield coated tile. Surrounding light activates the SurfaShield nanoparticles.



The activation mechanism of a SurfaShield T nanoparticle produces cleaning and sterilizing scavenging radicals that decompose pollutants or microbes.

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Nanotechnology

Packaging:

200L Barrels, 1000L IBCs

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What is the nature of the SurfaShield T coating?

SurfaShield is a water based formulation consisted of a unique mix of inorganic oxides with titanium dioxide being its main component. The final coating creates a purely inorganic nano-structure that bonds on the surface of existing materials without thermal treatment. SurfaShield T is a formulation that results in coating functionality and industrial applicability. The material demand comes from both large-scale (hospitals, pavements for large public buildings, outside coverings for multi-storey buildings, etc.) and private constructions (bathrooms, kitchens, etc.).

How is SurfaShield T applied during the tile production process?

A wet, spraying deposition method has been chosen to combine simplicity and minimum disturbance to the existing industrial processes. SurfaShield T is transparent, chemically inert and perfectly adheres on ceramic surfaces by chemically anchoring on the existing surface. The method involves overhead high quality air-spraying (HVLP or atomizing airless spraying) just after the main furnace exit, when tiles are cooled down, at surface temperature of 50-60°C. No other post treatment is required. Before packaging of tiles, adhesion process has been completed. Estimated consumption rate: 30-38 m²/L.

How does it work?

SurfaShield T makes tiles self-cleaning and self-sterilizing. Due to their nano-size, SurfaShield T particles absorb the available surrounding light energy (natural or artificial) and a series of physical phenomena takes place. In particular, light energy is transferred to water and oxygen molecules abundant in the environment. Both water and oxygen molecules are transformed to reactive, short-living radicals (hydroxyl and oxygen radicals respectively) that "attack" bacteria or organic stains within a range of 50 µm from the surface.

What is the benefit for ceramics tiles manufacturers?

SurfaShield T promotes the transformation of energy in favor of cleanliness and quality of life. It is not consumed or altered. The coating decomposes organic substances protecting the tiles from stains and colorization by air pollutants. The most important advantage is the bacterial and fungal protection of your favourite ceramic surfaces! With the increased presence of microbial health hazards and other pollutants, the need to work and live in a clean environment is becoming more important than ever. Viral and bacterial infectious diseases such as SARS, the Swine flu (H1N1) and hospital-acquired infections are serious threats to public health. Guess where you can find most of these microbes? On your favourite ceramic surfaces! Therefore, high hygiene standards are not only required in hospitals but also in common areas such as kitchens, lavatories, nursing schools etc. SurfaShield also works as an air purifier as it decomposes harmful organic substances such as volatile organic compounds (VOC) and car exhaust fumes and nitrogen oxides (NOx). As a result your surfaces become safer, without the use of dangerous chemicals, and are preserved like new.

SurfaShield T Test and Validation

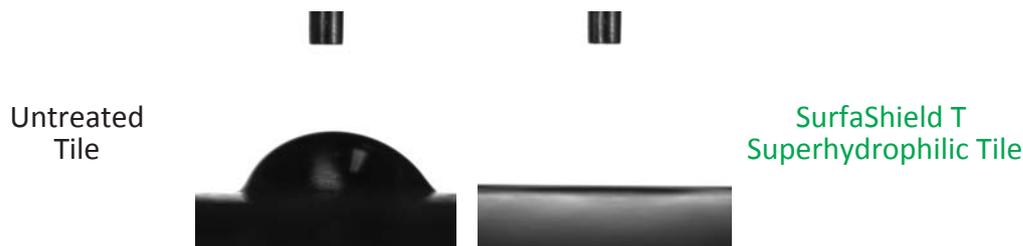
Abrasion test (ISO 10545-07): Class 3

Antibacterial test (ISO 27447): 98,9% bacterial colony reduction within 4 hours

Antifungal test (ISO 27447): 87,27% fungal colony reduction within 4 hours

Contact angle: <5° after 30 min under direct sunlight (superhydrophillic)

Photocatalytic Activity (Methyl Orange Test) Rate: 5.92 x 10⁻⁵ min⁻¹



Application Note

The application surface should be dry and clean. Apply SurfaShield T by air-spraying at a consumption rate of 30-38 m²/L, strongly dependant on the properties of the surface applied. No dilution is required. At an industrial level, application takes place on single-firing (monocottura) tiles, just after exiting the main furnace and when their surface temperature is at 50-60°C. Shiny or glossy finish ceramic tiles should be given the appropriate care (HVLP spraying is recommended) to eliminate visible defects.

Physical Properties

Milky white, Water Suspension with slight odour and pH = 9-9,5.
Boiling & Flash Point: 44°C
Density: 1 g·cm⁻³ Viscosity: 1,45 cP
SurfaShield T is not considered an oxidant.

Safety & Storage

SurfaShield T contains no dangerous ingredients and it is water based. VOC Content: 36g/L (EU limit (2010): 40g/L). Not hazardous according to Council Directive 1999/45/EC and its subsequent amendments. Request, read and comprehend the MSDS. Avoid freezing. Expiration Date: 18 months after the production date.



What is Nanotechnology?

Nanotechnology refers to the scientific field, which deals with very small structures, usually sized below 100 nm. One nanometer (nm) is one billionth of a meter (10⁻⁹ m) - it is so small that if earth were one meter in diameter, then one nanometer would have been the size of an apple! Nanosized materials reveal unique properties when compared to ordinary, bulk materials or even molecules.

NanoPhos at a Glance...

At NanoPhos, we take advantage of the unique properties of nanotechnology and invent clever materials that solve every day problems. By harnessing nanotechnology, we seek to create a more comfortable, safe and trouble-free living environment. We transfer innovations out of our lab into the hands of consumers. Our vision is clear: "Tune the nanoworld to serve the macroworld" – in simple terms we make nanoparticles solve common problems. NanoPhos was recognized in January of 2008 by Bill Gates as one of the most innovative companies and also received the 1st prize for innovation at the prestigious 100% Detail Show in London. NanoPhos is a rapidly growing company that is actively expanding its distribution network. Currently, the company is present in the UK, Ireland, Norway, Sweden, Finland, Denmark, Portugal, Italy, Greece, Cyprus, Japan, K. of Saudi Arabia, K. of Bahrain, China, New Zealand, Australia and Mexico.

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NanoPhos SA has been approved by Lloyd's Register Quality Assurance to follow the EN ISO 9001:2008 Quality Management System and EN ISO 14001:2004 Environmental Management System for the production and sales of chemical products for cleaning and protection of surfaces and nanotechnology products.

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