

HYTECT

ADDED VALUE FOR PEOPLE,
BUILDINGS AND CITIES



Ceramic surfaces with



HYTECT
THE HYGIENE TECHNOLOGY

**EFFECTIVE
AGAINST BACTERIA**

**EASY
TO CLEAN**

**CLEANS
THE AIR**

**PROTECTS
AGAINST DIRT**



WITH THE HELP OF NATURE – **FOR PEOPLE AND BUILDINGS**

Hytect technology is permanently burned into the ceramic surface at high temperatures. When light falls on the coated tiles, active oxygen is released via photocatalysis. This provides the effect against bacteria and mould. At the same time, Hytect tiles neutralise pollutants in the air in an entirely natural manner.

Because they are also hydrophilic, it is hard for dirt or grease to gain a foothold. Each of these effects continues to apply across the entire life cycle of the tiles. And thanks to an extensive range of products, Hytect ceramic can be used in a wide variety of areas.

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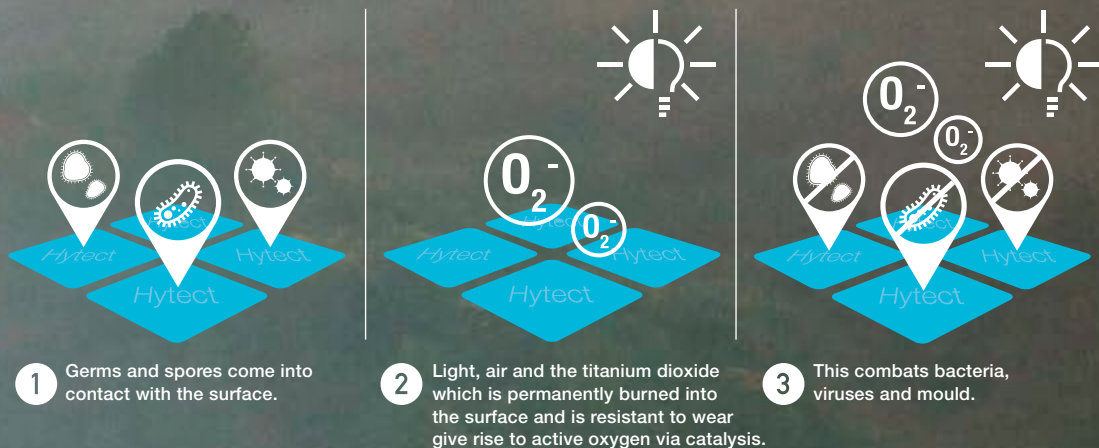
How we produce Hytect ceramic

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LIGHT WORKS

HOW HYTECT PREVENTS MOULD & BACTERIA

Small details, major impact: in combination with light and oxygen, the surface of Hytect ceramic releases active oxygen in a natural manner. This prevents the growth of mould, viruses and bacteria directly on the surface.



The Hytect effects outlined above are primarily based on the principle of photocatalysis, which requires light, oxygen and moisture. Hytect not only works with UV light and daylight but also with all conventional light sources, even LED. Accordingly,

Hytect tiles are also suitable for bathrooms, whereby lighting during normal use is sufficient to achieve the Hytect effect. In fact, the antibacterial effect would even be in place during total darkness.



Ideal for the spa area
 Emser Thermal Baths, Bad
 Ems, Germany / Architect:
 4a Architekten, Stuttgart /
 Photo: David Matthiessen



**Practical in medical
 facilities**
 Rudolfsheim-Fünfhaus
 residential nursing home,
 Vienna, Austria / Architect:
 wup / Photo: Andreas
 Buchberger



Sustainable for pools

Indoor swimming pool, Dauphins-sur-le-Parc, Montreal, Canada / Architects: Lapointe Magne & associés / Photo: Rolf Klebl



**Active against
mould**

When exposed to light, a photocatalytical process generates free oxygen radicals on the Hytect surface which actively combat microorganisms. This creates a new dimension of hygiene.

PERFECT FOR POOLS AND SPAS

Hytect – hygienic, good for the environment and economically feasible

Spas and wellness oases draw huge crowds, the largest even attracting several thousand visitors a day. But wherever crowds of people are out and about, they are also accompanied by germs and bacteria.

Guests rightly expect maximum cleanliness in swimming pools. Hytect ceramic tiles help pool operators to achieve this goal in an environmentally-friendly manner. Dust, dirt or even residues of soap and cream are unable to gain a foothold on Hytect surfaces. Neither in swimming pools nor showers at sports facilities or gyms. As soon as Hytect surfaces come into contact with water, a fine film of water is formed on them. Dirt is simply infiltrated and easily wiped away – if it has not already been rinsed off while showering.

Disinfecting agents are often used in saunas and barefoot areas to render germs harmless. Hytect makes it possible to minimise the use of such cleaning agents while achieving a financial advantage in the process. After all, the oxygen radicals released on the Hytect surface actively combat the growth of microorganisms.

Hytect tiles, therefore, are gentle on the environment as less cleaning agent is required for an optimum result. Furthermore, they also hugely reduce the efforts associated with maintenance cleaning. And they are available in a variety of designs and surfaces as well as variants which meet all of the requirements on safety in swimming pools and spas.



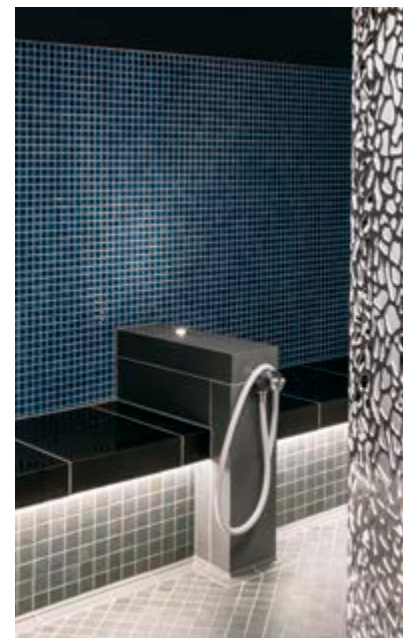
Simply hygienic for indoor pools

Koning Willem-Alexander Sports Complex, Hoofddorp, Netherlands /
Architects: Slangen+Koenis Architecten / Photo: Marcel van der Burg



Ideal for wellness and spas

Hotel AMERON Neuschwanstein Alpsee Resort & Spa, Germany / Architects: Team at
BKLS Architekten + Stadtplaner BDA, Munich and Architekturbüro Johannes Wegmann,
Schliersee/Neuhaus / Interior design: landau + kindelbacher, Munich / Photo: Fotodesign
Peters, Amerang



Reliable in steam baths

Friedrichshafen sports pool /
Architects: Behnisch Architekten
Photo: David Matthiessen

EFFECTIVE IN PUBLIC FACILITIES

Hygiene measures are specified in hospitals, doctors' surgeries and nursery schools. Hytect helps to comply with them.

Infection laws specify hygiene standards for public facilities, whereby structural conditions also play a major role. This is obvious at first glance in hospitals.

E.g. automatic door openers or non-contact water taps. Hytect tiles are also a hygiene factor throughout the hospital. After all, germs cannot practically survive on their surfaces. Something which is also decisive in operating theatres, for example, the origin of many of the several hundred thousand hospital infections recorded per year.

As a general rule, Hytect helps to reduce the efforts involved in daily maintenance cleaning in medical facilities or nursing homes as it creates a hydrophilic surface and infiltrates dust, dirt and other organic substances.

In patients' bathrooms, hospital rooms and therapy rooms, changing occupancy and high levels of public traffic give rise to lots of dirt and a high germ load. Hytect is also effective here and contributes to achieving a permanently hygienic environment.

Hytect technology is burned directly into the tile but this does not make it any less durable than conventional ceramic. In fact, it is eminently suitable for use in child day-care centres, schools and other high-traffic areas.



Strong in child day-care centres and schools
KiTa Zwergenland, Gräfenroda, Germany / Architect:
Steinbacher-Consult GmbH / Photo: Claus Graubner



Particularly suitable for patients' bathrooms and sanitary facilities



Special glazes for use in lasers in operating theatres Krankenhaus der Barmherzigen Brüder, Munich, Germany / Architect: Generalplanung Architekt Szauer, Eisenstadt, Austria / Photo: Monika Custodis



Active against **germs and bacteria**

Active oxygen reliably destroys bacteria, viruses, germs and spores. This occurs invisibly on Hytect tiles as this effect can be neither seen nor smelled. Nevertheless, they provide long-term support in surface disinfection in hospitals etc.

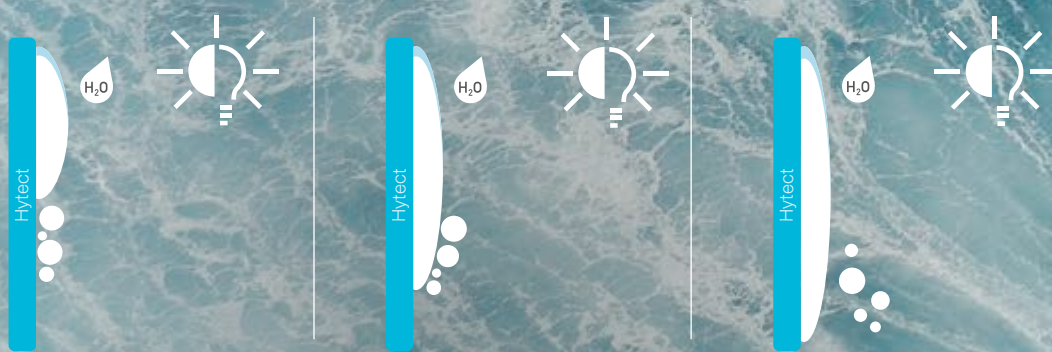


More hygiene in nursing and therapy areas Krankenhaus der Barmherzigen Brüder, Munich, Germany / Architect: H. Kochta & Partner, Schirmer & Schrader / Photo: Monika Custodis

WATER CLEANS

WHICH IS WHY HYTECT TILES ARE **EXTREMELY FAST TO CLEAN**

Water droplets do not remain on Hytect ceramic. In fact, water forms a fine film which infiltrates dirt and grease, making Hytect tiles extremely easy to clean.



1 Hytect ceramic overcomes the surface tension displayed by water.

2 Instead of individual drops, water forms a fine film on the tile surface.

3 Dirt and grease are infiltrated and easily wiped away.

Hytect tiles help to keep surfaces clean. They save on cleaning agents and reduce the time involved in cleaning. Both of these factors mean that Hytect is also of financial

interest. The recommended standard cleaning materials can also be used for cleaning the tiles.



**Dirt-repellent
on facades**
Naabtal-Realschule,
Nabburg, Germany /
Architect: Architekturbüro
Schönberger / Photo:
Atelier Bürger



**Clean solution
for schools**
Gesamtschule St. Ursula,
Duderstadt, Germany /
Architect: Architekturbüro
Bringmann, Bilshausen /
Photo: Jochen Stüber



More cleanliness in catering me and all Hotel, Mainz, Germany / Architect: FLUMDESIGN / Photo: Nicole Zimmermann



Easy cleaning in kitchens

Dempsey Barracks, Paderborn, Germany /
Architect: BLB NRW, Ms Lachmann /
Photo: Fotostudio Bieleesch



Practical in public

Backfactory, Hanover, Germany
Architect: Backfactory GmbH
Photo: Jochen Stüber



Unbreakable and serviceable

Globus Warenhaus, Rüsselsheim, Germany
Architect: Globus SB-Warenhaus Holding GmbH
& Co. KG / Photo: Claus Graubner

EXTREMELY WEAR-RESISTANT IN CATERING AND TRADE

Hytect-coated tiles hugely facilitate the cleaning process.

In catering and various areas of trade, walls and floors are invariably soiled with dust and dirt, grease, oil and smears. In such areas, tiles are the material of choice. Particularly when coated with Hytect as it facilitates the removal of dirt and greasy residue.

This is something to be taken for granted in kitchens and canteens and not only within the framework of the HACCP hygiene guidelines: worktops, floors and walls need to be cleaned every day. This translates into a high level of personnel which can however be reduced using Hytect technology.

After all, drops of water on the hydrophilic Hytect surfaces form a fine film of water which infiltrates grease and oil, enabling them to be simply wiped off.

This is also an interesting factor in dining areas as many visitors and often hectic operations automatically mean dirty floors – yet maintenance cleaning aims to be as inexpensive and fast as possible. Similarly, Hytect is also suitable for supermarkets where clean floors are synonymous with hygiene.

The fact that planners have full freedom of design in terms of non-slip quality as well as durability when using Hytect-coated tiles simply goes without saying.



Active against **smears, grease and dirt**

As they are hydrophilic, a fine film of water forms on Hytect tiles during cleaning. This infiltrates dirt and grease and makes them easier to clean.



Self-cleaning and aesthetic Raiffeisen Forum, Mödling, Austria / Architects: X42 Team, Vienna, Austria / Photos: Rich Hiebl

FOR PERMANENTLY ATTRACTIVE FACADES

The self-washing effect achieved by Hytect automatically keeps facades clean.

The expenses associated with cleaning facades can be astronomical. It was not without reason that building cleaning companies in Germany, for example, recorded turnover of almost 20 billion euros in 2019 – with several millions of those euros entailing the cleaning of facades. Hytect can significantly reduce these expenses, saving on the running costs for property operators.

This is due to the self-washing effect achieved by Hytect: dust, dirt and other particles are infiltrated every time it rains

and simply washed off the facade.

With the result that building shells retain their attractive appearance for many years. Furthermore, ceramic facades featuring Hytect are also very resilient. Graffiti can be easily removed using the corresponding methods and without damaging the surface.

This ensures that Hytect facades remain attractive and presentable over the long term. The costs of mechanical cleaning are practically dispensed with altogether.



Active against facade grime

How the Hytect self-washing effect works: when it rains, a fine film of water forms on the surface. This infiltrates dirt and even the finest dust particles.

PROTECTION FROM MOSS, FUNGI AND ALGAE

Grey or green smears and streaks are prevented by Hytect.

Thermal insulation on buildings has both positive and negative effects. For example, moisture precipitates on insulated outer shells during dew periods. And it can stay there for a considerable amount of time. If there are also dust, dirt or other organic substances on the facade, a practically ideal breeding ground is created for micro-organisms, such as moss, algae or fungi. This can lead to unattractive stains on the facade.

But the possibility of such stains is practically excluded on facades featuring Hytect ceramic where neither dirt nor dust can gain a permanent foothold. What's more, the photocatalytical effect triggers the generation of activated oxygen, preventing fungi and moss from even growing on the facade in the first place.



Permanently attractive facades New Union Wharf Apartments, London, Great Britain / Architect: PRP Architecture / Photo: Simon Hadley

But this process is particularly decisive when it comes to algae. After all, they do not require a classic breeding ground but merely nutrients from the air to survive. Accordingly, they can grow practically anywhere – just not on surfaces featuring Hytect. Thanks to Hytect, the use of biocidal products can be dispensed with entirely and cleaning agents minimised – not only on facades but in all risk areas in buildings. Due to the fact that they are permanently and reliably protected by clever Hytect technology.



Active against **moss, fungi and algae**

Dual protection: active oxygen “arising” when light falls on Hytect breaks down moss, bacteria, fungi, algae and mould. The self-washing effect deprives them of their breeding ground.

WITHOUT **HYTECT**

Building in Bratislava, 17 years old



WITH **HYTECT**

Building in Bratislava, 16 years old

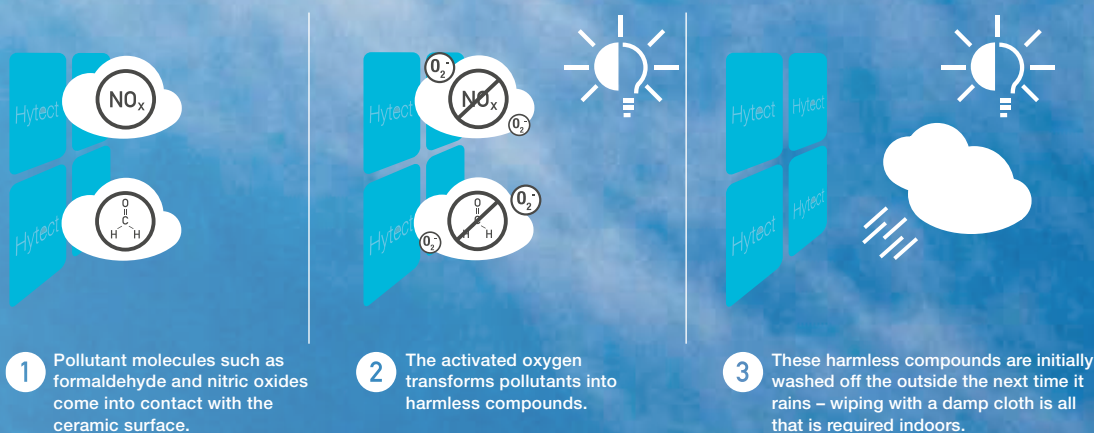


The same city and the same environment – the same look – but with and without Hytect: where the facade at the top has dirtied and greyed with age as dirt and moss have gained a firm foothold, the building depicted below it has lost none of its perfect appearance even after many years, thanks to Hytect. Without any extra cleaning, it should be noted. And without using any environmentally-harmful fungicides or other chemicals. This is the contribution Hytect makes towards sustainability.

AIR CLEANS

HOW HYTECT CAN BREAK DOWN POLLUTANTS IN THE AIR

Hytect ceramic activates a natural process in which the air is cleaned. Nitric oxides and odours are neutralised, for example. This makes it an ideal material for kitchens, sanitary facilities and more.

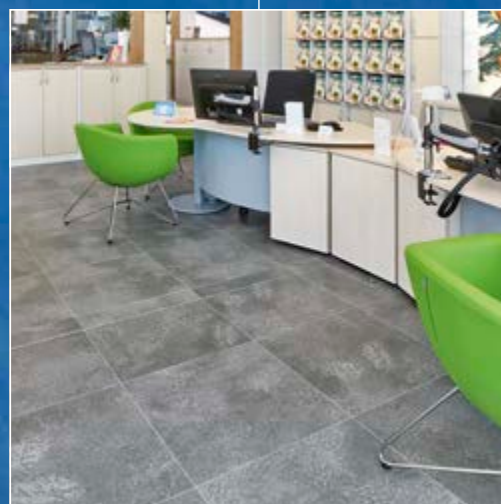


It is not necessarily possible to perceive formaldehydes and other emissions in interiors – but they are unhealthy in high concentrations. Here, too, Hytect helps to achieve a healthy living atmosphere, simply by neutralising nitric oxides.

These had already earned a bad reputation long before the diesel scandal as they can have a long-term negative impact on our health. Hytect helps to prevent this. Imperceptibly and for the entire life cycle of the tile.



Hytect cleans the air of pollutants such as NO_x
Fabrikkgatan, Bergen, Norway / Architect: Ramboll Norge AS Div / Photo: Morten Wanvik



For individual and healthy interiors
Neuenhaus railway station, Germany / Architect: Lindschulte Ingenieure + Architekten / Photo: Jochen Stüber





Cleanliness which can be seen and smelled Maulburg indoor pool, Germany / Architect: Kramer Architekten, Freiburg / Photo: Jochen Stüber

EFFECTIVE IN ODOUR-SENSITIVE AREAS

Hytect eliminates odour-forming microorganisms and neutralises pollutants in the air.

It is an essential factor of perfect hospitality for hotels and restaurants to smell nice. Then guests feel more relaxed. It is not for nothing that many hotel chains even create their own feel-good fragrances to pamper their guests' noses. Hytect does the same thing indirectly.

After all, bacteria or fungi are responsible for bad odours. But these microorganisms are unable to gain a foothold on Hytect tiles. Which means many unpleasant odours are simply unable to arise in the first place.

This is also of advantage in pools, spa areas, indoor pool and toilet facilities. Because the conditions for organisms forming odours are practically ideal there without Hytect. Furthermore, they usually reach our noses faster in smaller spaces.

Hytect even neutralises bad-smelling pollutants in the air, such as formaldehyde. This gas is emitted by furniture or carpets, for example. And it can be unpleasant for guests in restaurants or hotels.



For particularly hygienic sanitary areas
Eisengießerei Baumgarte, Bielefeld, Germany / Photo: Jochen Stüber

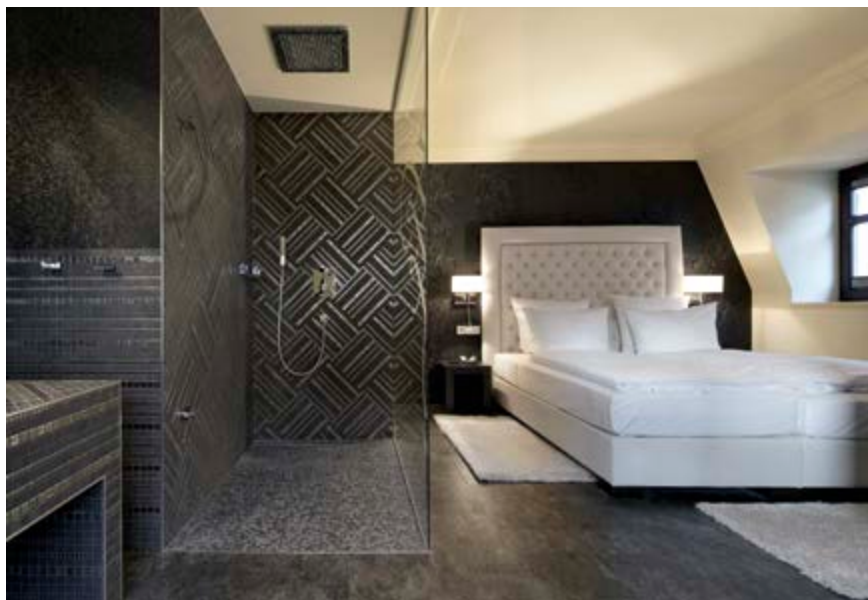


Sustainably effective and practical for pools
Okura Hotel Amsterdam, Netherlands /
Photo: Marcel van der Burg



Active against **unpleasant odours**

Hytect neutralises bad-smelling bacteria, fungi and microorganisms. And it extracts odours from pollutants in the air, ensuring a more pleasant stay and use of facilities.



Ensures a feeling of well-being Hotel, Restaurant Schöne Aussicht

STRONG IN THE BATTLE AGAINST POLLUTANTS

Hytect lowers the concentration of pollutants in the air, such as NO_x or formaldehyde.

Formaldehyde can cause cancer, something which has been specified by the EU 2014. It also has a reputation for impairing memory, concentration and sleep. The dilemma: many construction materials outgas formaldehyde, e.g. furniture and flooring. But it is also released by tobacco smoke, burning candles or disinfectant and cosmetics.

Hytect counteracts this. On the surface of the tiles, the active oxygen neutralises formaldehyde from the air, creating a healthy living atmosphere. A similar process occurs in the case of NO_x where Hytect also makes a contribution to healthy living.

In offices, for example, desks or carpets release formaldehyde into ambient air. This can have a negative impact not only on employee health but also on their well-being

and therefore performance capacity.

Replacing carpet with vapour-free tiles is one major step in the right direction. But even more can be achieved with Hytect tiles as they naturally convert formaldehyde released by other items into harmless salt – which can be simply wiped away. This is good for a healthier room atmosphere.

In public areas, Hytect is ideal for reducing the concentration of NO_x or formaldehyde in the air. Just how decisive this is is shown by the public discussion about cars and the pollutants they emit into our living spaces.



Breath-takingly beautiful – and good for the indoor climate Studio photo / Draft: Andreas Crynen, Ingenhoven Architects, Germany / Photo: Jochen Stüber



Clean lines meet clean indoor air "Philosophikum" seminar building, Gießen, Germany / Architect: pbr Architekten und Ingenieure / Photo: Hans-Jürgen Landes



Shopping experience in a feel-good atmosphere Boutique Mico Leipzig, Germany / Photo: Günther Fotodesign

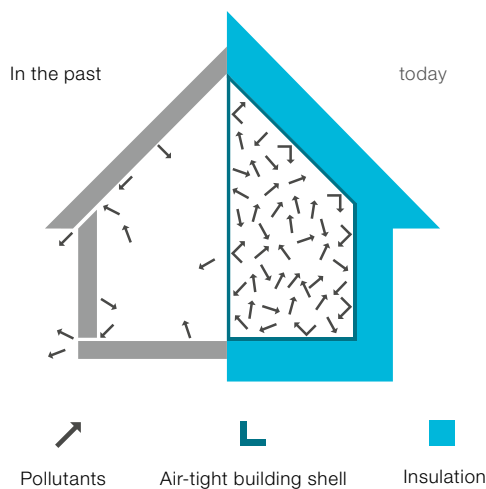
By using Hytect, public building owners can make an impact. This starts on the outside with the facade but is also possible in interiors which are accessible to the public. Or in tiled tunnels or underpasses where Hytect also automatically ensures better air quality.

Retail trade and shopping centres rely on uniform spatial concepts. After all, people prefer to shop in places where they feel comfortable. This is supported when the air is positively influenced by Hytect. Here, too, easy cleaning of this ceramic is of particular advantage. And fewer chemical agents required, which is simply better for the indoor climate. What's more, Hytect ceramic is capable of withstanding extreme conditions in heavily-frequented retail areas.



Effective against formaldehyde and NO_x
LA FACTORY Restaurant, Cannes, France / Photo: Jérôme Kelagopian

BETTER AIR



Hytect neutralises pollutants such as NO_x or formaldehyde over the entire life cycle. This has a positive impact in modern buildings in particular which are practically air-tight thanks to insulation.



Active for an ideal indoor climate

Hytect neutralises pollutants in the air by means of photocatalysis on the surface. And it does not release any vapours.

BREAKING DOWN **NO_x**

**1,000 M² HYTECT FACADE
ANNUALLY NEUTRALISE
THE NO_x FROM 1,000
ROUTES OF 10 KM EACH.**



NO_x breakdown by Hytect

Diesel car emissions class	EURO 3	EURO 4	EURO 5	EURO 6	
Hytect breakdown rate	0.4	0.4	0.4	0.4	mg/m ² h
Active time 1	12	12	12	12	h/day (brightness)
Active time 2	7	7	7	7	days/week
Active time 3	52	52	52	52	weeks/year
Area	1,000	1,000	1,000	1,000	m ²
NO _x emissions	500	250	180	80	mg/km
Equivalent in km	3,000	7,000	10,000	22,000	km/year
Routes	300	700	1,000	2,200	10 km each



A CLEAN SOLUTION FOR CITIES AND PEOPLE

Facades can make a huge contribution towards making our cities cleaner.

Hytect neutralises nitric oxide to a degree which should not be underestimated. In fact, we have done the maths: over a year, 1,000 m² Hytect facade neutralise roughly the equivalent of NO_x emissions by a Euro-5 car driving 10,000 kilometres. In the case of modern Euro-6 cars, it even amounts to NO_x emissions over 22,000 kilometres – and therefore 1.6 times as much NO_x as is emitted annually by each individual German driver.

Hytect facades can, therefore, contribute towards improving air quality in cities over the long term. And they definitely make a contribution which is beneficial to the environment. After all, Hytect facades hardly need any cleaning at all. This is also an environmentally-friendly factor as the use of chemical agents or electric cleaning equipment simply is not necessary.

FOR LESS NO_x IN THE AIR

Hytect converts NO_x gases into harmless substances which are soluble in water.

All over the world, billions are being invested in technologies to reduce nitric oxide emissions. This is primarily a task of the automotive industry. But there are also other areas where approaches can be taken. Using photocatalytical surfaces, for example, which convert NO_x into harmless substances to be simply washed off the surface by the rain. This remains the case over the entire life cycle of the ceramic.

Measurements clearly indicate that particularly large volumes of NO_x are incurred on busy roads and streets. But this gas also accumulates in high concentrations in tunnels. Hytect is eminently suitable for such applications. After all, it cleans the air during daylight and even when surfaces are illuminated by artificial light. And because Hytect is so easy to clean – or dirt is rinsed off when it rains thanks to its

self-washing effect – it is even more beneficial in terms of environmental protection in municipalities.

But this is not the only contribution made by this effect. Hytect ceramic as facade cladding is practically indestructible. No renovations are necessary for decades which saves both resources and energy. Moss and fungi are automatically prevented by Hytect. All of these factors ensure that much lower levels of pollutants are emitted over the entire life cycle of the ceramic.



Setting visual highlights Downing Students City Village, Belgrade Plaza, Coventry, Great Britain / Architects: Simpson Haugh and Partners Group / Photos: Simon Hadley



Even cleans the air in tunnels

Hugh L. Carey Tunnel, New York, USA / Architect: HAKS, New York / Photo: Titus Kana



Effective where high levels of pollutants arise

Fedor van Kregtentunnel, Netherlands / Architect: Royal Haskoning DHV, Mr Mari Baauw / Photo: Marcel van der Burg



Versatile design Slangenwand, Hoofddorp, Netherlands / Architect: NIO Architecten, Rotterdam / Photo: Marcel van der Burg



Active in **breaking down NO_x**

Hytect photocatalysis reduces NO_x: pollutant molecules come into contact with the surface and are converted into salts which are soluble in water. These are then washed off by the rain or they can be wiped away with water.



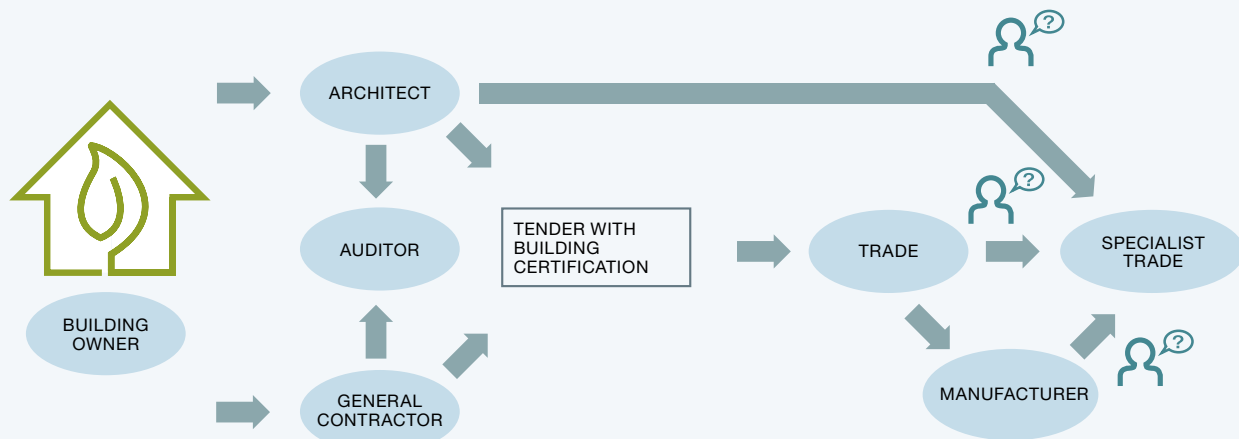
LEED PLATINUM Crédit Agricole Green Life Headquarters, Parma, Italy / Architect: Frigerio Design Group / Photo: Enrico Cano, Frigerio Design Group

Building materials need to be evaluated very specifically for building certification. In this regard, Hytect represents a beneficial factor in the extensive tender specifications.

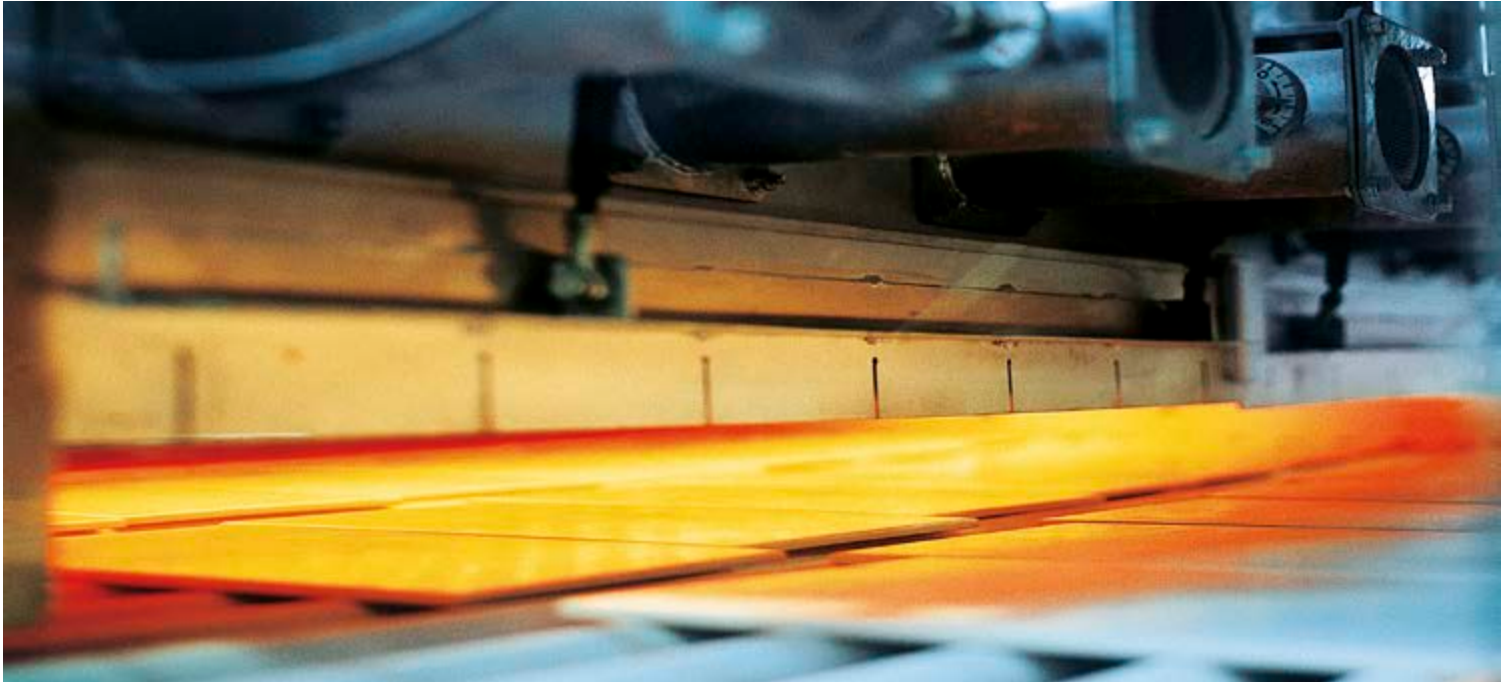
very complex process which is why we support planners and architects in this area by providing them with comprehensive information. We make all product features of our tiles which are of relevance for certification transparent. And we have coordinated our

This way, we facilitate auditors in evaluating the material for the certification process.

BREEAM (Building Research Establishment Environmental Assessment Methodology) is an assessment which originated in Great Britain. Today, BREEAM systems are applied internationally in more than 80 countries for evaluating sustainability. The assessment incorporates both ecological and socio-cultural aspects.



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Hytect is permanently burned into the surface.

HOW HYTECT CERAMIC IS MADE

The Hytect effect is created by a photocatalytical form of titanium dioxide (anatase) specially developed for this application. During the manufacturing process, it is applied at high temperature causing it to merge inseparably with the surface.

HYTECT: NATURALLY SAFE

The titanium dioxide merges inseparably with the surface during the firing process. It is not consumed over years of use and the Hytect effect is retained permanently and unchanged. Hytect ceramic can be safely used in all areas of application and has even been tested for its compatibility with food.

POSITIVE FEATURES ARE RETAINED

Like other tiles, Hytect tiles are also:

- color- and light-fast
- non-flammable
- free of emissions and solvents
- resistant to chemicals
- antistatic
- thermally conductive

PRODUCT WARRANTY BY DEUTSCHE STEINZEUG

Ceramic featuring the Hytect coating is distinguished by the fact that it is extremely resistant and durable. This is also reflected in the unique long-term warranty we grant on the effectiveness of Hytect ceramic.

PARTICULARLY DURABLE

Ceramic tiles have proven their worth for thousands of years – and they remain a popular building material today. After all, they are resilient and safe as they do not release any pollutants. Ceramic tiles are usually easy and inexpensive in terms of care. And none of these characteristics is altered in any way by the Hytect coating. On the contrary: Hytect makes tiles even easier to clean and even more attractive in appearance.

CONVINCING ARGUMENTS

The effects of Hytect (HT) have been confirmed by renowned test institutes.

ANTIBACTERIAL EFFECT

- Fraunhofer Institute, Schmallenberg
ISO 27447)
- Dr Ralph Derra, ISEGA – Forschungs-
und Untersuchungs-Gesellschaft mbH
Aschaffenburg

BREAKDOWN OF POLLUTANTS/ ODOURS:

- Fraunhofer Institute, Braunschweig
(ISO 22197-1)
- Fraunhofer Institute, Holzkirchen
- Prof. Dr Horst Kisch, Friedrich Alexander
University of Erlangen / Nuremberg

EASY TO CLEAN

- Fraunhofer Institute, Braunschweig
(ISO 10678:2010)

FOOD-SAFE

- Dr Ralph Derra, ISEGA – Forschungs-
und Untersuchungs-Gesellschaft mbH
Aschaffenburg



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