

TOTO



HYDROTECT

Harnessing light and water,
the power of nature cleanses the Earth.

Hosting a superb harmony of nature and life, the Earth is truly a miracle.
With this miracle now under threat,
TOTO developed the HYDROTECT technology to protect our planet.
Just like nature, HYDROTECT draws on sunlight, rainwater,
and other natural forces to help cleanse the global environment.
This means a more comfortable living environment for all of us.
Our technology harnesses the power of nature
to cleanse the environment naturally and protect the future of the planet.



HYDROTECT

The benefits of plants can be seen not only in their oxygen-generating capabilities.



Although it is not widely known, plants also purify the air. For example, they can absorb and remove air pollutants called nitrogen oxides (NOx), which are regarded as a global problem because they cause acid rain and urban ozone (photochemical smog). HYDROTECT removes NOx on the exterior walls of buildings just as effectively as plants.* We deliver clean environments, even in cities where it is not easy to plant trees.

HYDROTECT has the same purifying capabilities as plants.

* For exterior

Do you have any idea roughly how much rain falls around the world?



The answer is 108 trillion tons¹ each year...much more than most people would even guess. In an effort to harness the beneficial properties of this tremendous natural resource, we have equipped HYDROTECT with self-cleaning capabilities, enabling it to use rainwater to clean² dirt from buildings naturally and effectively. Your offices, apartment buildings and homes will become cleaner every time it rains.

HYDROTECT uses rainwater to wash away dirt.

1 Source : White Paper on Water Resources (2009 Version)(Ministry of Land, Infrastructure, Transport and Tourism of Japan) 2 For exterior

Let us tell you something interesting
that will make you like cleaning.



Germans have a saying: "Order is half of life."
As this suggests, it is very important
to keep your surroundings clean
and tidy, because if you can
do so on a day-to-day basis, you somehow get
the feeling that a large part of your life will go well.
HYDROTECT can help you do just that.
Thanks to its antibacterial, anti-mold, anti-dirt
and anti-odor capabilities*, HYDROTECT helps you
keep your surroundings clean and even healthier,
leaving you free to enjoy your life.

**HYDROTECT lends a hand
with day-to-day cleaning.**

What can we do to make the planet healthier
and people around the world happier?



HYDROTECT harnesses the power of nature to purify
the air and minimize negative environmental forces,
enabling you to make your everyday
living environment more beautiful—
without making any extra effort
or changes to the way you live.
TOTO intends to take HYDROTECT global
to help protect environments all over the world,
harnessing much-needed technology
that strikes a balance
between eco-awareness and comfort.

**HYDROTECT will help promote
environmental cleansing the world over.**

Harnessing the power of light to cleanse the environment

Essentially, HYDROTECT is an environmental cleaning technology utilizing photocatalysts that harness the power of light and water to purify air and clean surfaces—automatically. It can be used effectively in numerous applications, from exterior walls to interior walls and floors.

INTERIOR

- Resists bacterial growth and propagation of mold
- Prevents dirt
- Prevents odors

EXTERIOR

- Cleans the air
- Self-cleaning
- Resists mold and prevents algae

<TOTO products>

Interior and exterior tiles and building materials
Interior and exterior paints (coating materials)

<Material supplies and licensing>

Ceramic siding, polycarbonates, plate glass,
metal sidings, stone, tents and numerous others

The photocatalytic properties of HYDROTECT

HYDROTECT produces a number of environmentally-beneficial effects, including air purification and self-cleaning, through a process similar to photosynthesis in plants. When exposed to sunlight, HYDROTECT's photocatalytic layer (titanium dioxide) breaks down organic material so that it is easily washed away with rain or water.

Decomposition Power

When exposed to light, titanium dioxide (TiO_2) produces electrons (e^-) and holes (h^+). These react with oxygen and water ($\text{O}_2, \text{H}_2\text{O}$) in the air and produce activated oxygen ($\text{O}_2^-, \cdot\text{OH}$), which decomposes various organic substances and bacteria, on the surface of products.

Super Hydrophilicity

When titanium dioxide (TiO_2) is exposed to light, the titanium (Ti) reacts with water (H_2O) in the air, producing a hydrophilic group ($-\text{OH}$) layer that blends easily with water on the surface of products.

Air purification D

When exposed to sunlight, HYDROTECT on the surface of buildings exterior walls removes nitrogen oxides (NO_x) produced by exhaust fumes and smoke, and purifies the air.

Air purification mechanism

Removes pollutants in the air (NO_x) through a photocatalytic reaction and purifies the air.

HYDROTECT

Nitrogen oxide (NO_x) → Oxidation and removal → Nitrate ions (NO_3^-)

* NO_x is oxidized and converted into nitrate ions. The nitrate ions are washed away when it rains.

Green land equivalent
(When HYDROTECT Color Coat ECO-EX is used for exterior finishing)¹

HYDROTECT for one private house (approx. 150m²) = **The same air purification effect as an area of green land the size of four tennis courts (approx. 1,000m²)²**

* Please refer to our company website for details on the bases for calculating the air purification effect.
* The test values obtained pursuant to JIS R 1701-1 have been converted to the absorption volume in green land by our company.
1 Approx. 150m² of the latest variety of HYDROTECT exterior tiles offer an air purifying effect equal to green land the size of roughly 3.5 tennis courts (approx. 940m²).
2 Calculation based on the NO_x absorption capability of green land (lawns and fields) being 4.4 mg/m² per day, pursuant to the Manual on Tree Planting for Air Purification published by the Environmental Restoration and Conservation Agency of Japan.; also calculation based on the area of a tennis court being approx. 260m².
* JIS R 1701-1 corresponding to ISO 22197

(For exterior)

Self-cleaning D H

Since HYDROTECT keeps buildings clean effortlessly, it reduces the amount of detergents and cleaning water needed for maintenance and improves environmental conservation.

Self-cleaning mechanism

Reduces adsorption of dust and other particles

Dust and other particles
Layer of water
Photocatalyst layer

The layer of water reduces adsorption of dust and other particles through static electricity.

Helps stop oily dirt from sticking

Oily dirt
Activated oxygen

Activated oxygen decomposes dirt clinging on the surface and helps prevent it from sticking.

Harnessing the power of the rain to wash surfaces

Rainwater gets in under dirt, lifting it off of the surfaces and washing it away.

(For exterior)

Antibacterial, anti-mold, anti-dirt and anti-odor capabilities D

By decomposing organic substances, photocatalysts also help improve hygiene inside and outside buildings, making it easy to keep walls, floors and other surfaces clean in locations such as toilets, bathrooms and kitchens and exteriors.

Antibacterial mechanism

Bacteria → Activated oxygen → Decomposition

HYDROTECT layer (Photocatalyst + antibacterial metals)

Activated oxygen is generated in areas exposed to the light. In conjunction with the antibacterial metals, the bacteria that cause odors and stains are reduced.

Excellent anti-bacterial capabilities maintain a clean indoor environment.
(With the use of HYDROTECT tiles and HYDROTECT Color Coat Eco-2000 for interior finishing)

In areas exposed to the light, **Bacillus coli** and **Staphylococcus aureus** are reduced by **99% or more in four hours.**¹

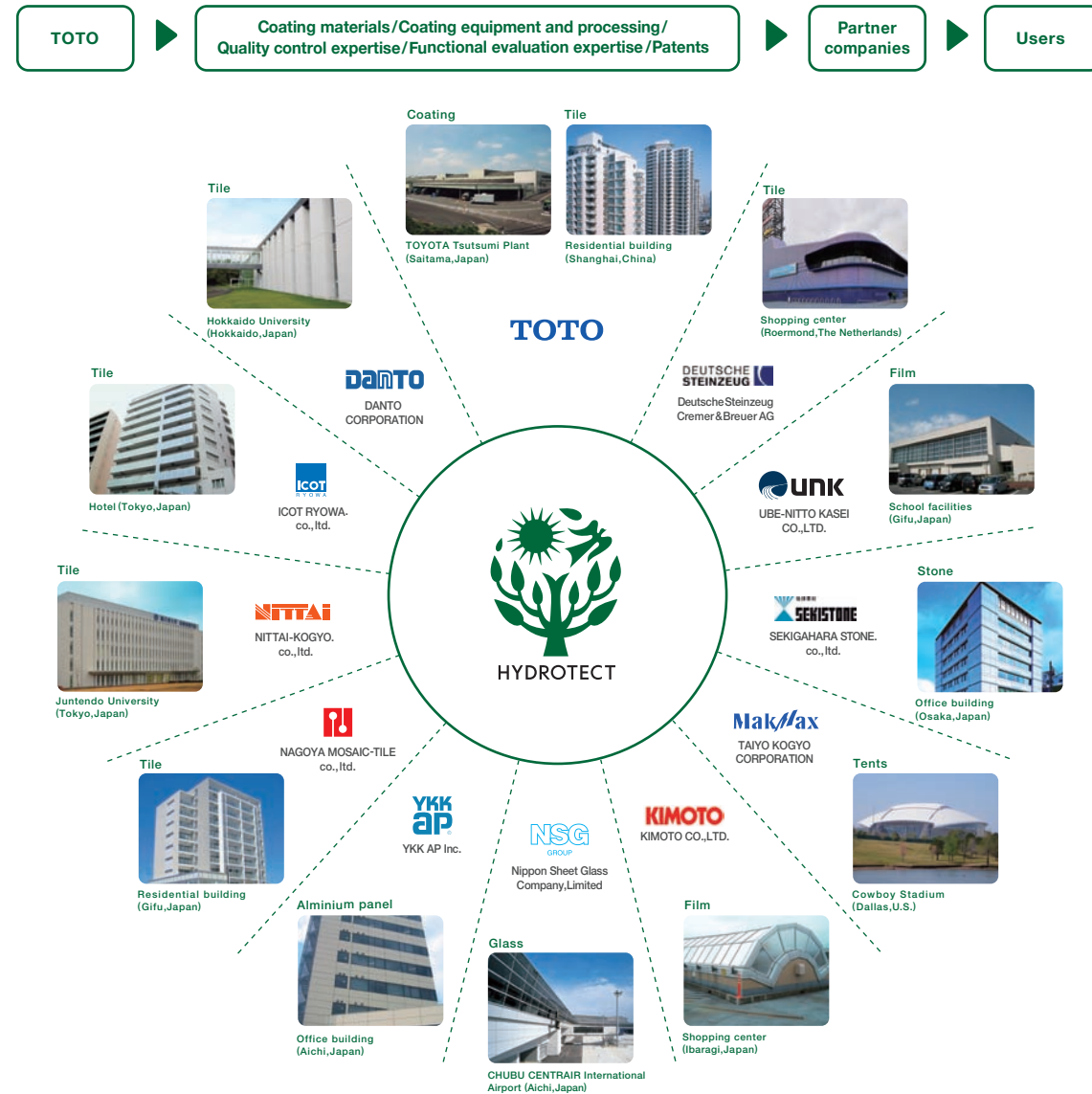
The hybrid photocatalyst that combines photocatalytic particles with antibacterial metals provides sufficient antibacterial effects, even in locations where there is minimal light.² When exposed to the light, even stronger effects are provided by the photocatalyst.

1 Pursuant to JIS R 1702; equivalent to areas that are near windows during the daytime 2 Pursuant to JIS Z 2801
* JIS R 1702 corresponding to ISO 27447, JIS Z 2801 corresponding to ISO 22196

(For interiors)

HYDROTECT Partners continue expanding globally

HYDROTECT Partners are spreading throughout the world through partnerships. TOTO will continue contributing to environmental purification along with our partners and customers, utilizing the photocatalytic technologies and experience accumulated to date, to disseminate HYDROTECT even further.



Feedback from overseas companies

Dieter Schäfer Chief Executive Officer, Deutsche Steinzeug Cremer & Breuer AG (Germany)

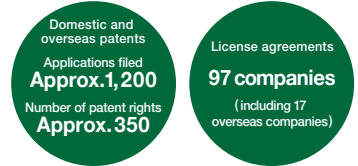


President, German Ceramic Tile Association / President, European Ceramic Tile Manufacturers' Federation

We have been using this groundbreaking environmental technology on our tiles for more than a decade now and have successfully increased sales based on the trusting and cooperative relationship that we have built up with TOTO. Although environmental protection was not such a prevalent issue when we first started using HYDROTECT, "green building" has now become a major priority. HYDROTECT is likely to be an essential technology for use in both new buildings and renovations in the future. The various benefits offered by HYDROTECT will have an even greater impact as they are incorporated into more and more building materials. As the number of companies using HYDROTECT is increasing, the future of our planet will be a bright one.

Photocatalyst-related patents and license agreements at work both within Japan and abroad

In addition to the basic invention of photoinduced super-hydrophilic technology, we have filed more than 1,200 domestic and overseas patent applications in relation to applied products, manufacturing technology and coating materials and have been granted approximately 350 worldwide patents to date. We have also signed license agreements with 97 manufacturers (including 17 overseas manufacturers) across a wide range of sectors mainly in Japan, North America and Europe.



Basic patents granted in countries around the world

Japan	China	Hong Kong	Taiwan	Korea	India	Thailand	Indonesia	Philippines
Singapore	Malaysia	Vietnam	United States	Mexico	Canada	Brazil	Australia	New Zealand
Germany	Czech Republic	United Kingdom	France	Italy	Sweden	Denmark	Belgium	Holland
Luxemburg	Spain	Portugal	Greece	Austria	Monaco	Switzerland	Ireland	Finland

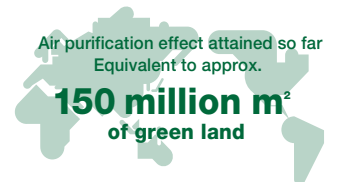
HYDROTECT licensee companies



Track record in environmental contributions recognized both in Japan and globally

When converted to an area of green land that purifies the air in a similar way, the air purification effect of HYDROTECT obtained to date is equivalent to approx. 150 million m².¹ This means that the amount of NOx discharged by approx. 1.8 million passenger cars² has been purified.

HYDROTECT has been recognized for its unique technology that cleans houses and the air with the force of nature, and it is highly valued by public institutions. TOTO will continue contributing to environmental conservation by disseminating HYDROTECT.



August 2005 Minister of Economy Trade and Industry Award, 1st Manufacturing Grand Prix	May 2006 Imperial Award for Invention, FY2006 National Invention Awards	November 2007 Japanesque Modern 100
----------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------	----------------------------------------

* Please refer to our company's website for details on the bases for calculating the air purification effect. The track record was calculated based on the domestic and overseas shipment of external coatings and tiles by the end of May 2010.
 1 Calculation based on the NOx absorption capability of green land (lawns and fields) being 4.4 mg/m² per day, pursuant to the Manual on Tree Planting for Air Purification (revised edition) published by the Environmental Restoration and Conservation Agency of Japan.
 2 Calculation based on NOx emissions of 362.2mg per day when a DBA gasoline powered passenger vehicle with an emission coefficient of 0.0125 drives 29.0km, the average daily driving distance of private cars. References for the passenger cars, vehicle types, models and emission coefficient were obtained from Emission Coefficient, a reference guide for preparation programs related to the Ministry of Land, Infrastructure, Transport and Tourism of Japan, the Road Transport Bureau's Automobile Usage Management Plan and Regular Report, which are published under the Act Concerning Special Measures for Total Emission Reduction of Nitrogen Oxides and Particulate Matter from Automobiles in Specified Areas. The average daily driving distance of private cars was calculated based on the average annual driving distance of private cars (10,575km) provided in the 2004 Basic Survey on Automobile Inspections, Check-ups and Maintenance published by the Road Transport Bureau of the Ministry of Land, Infrastructure, Transport and Tourism of Japan.

TOTO

For more information, please contact us.

EU
TOTO Europe GmbH
Phone: +49 2041 246-0 Fax: +49 2041 246-101
Contact: hydrotect@totoeu.com
Armelerstraße 20, 46242 Bottrop, Germany
http://eu.toto.com

CHINA
TOTO(CHINA)CO.,LTD
Phone: +86 10 85860500 Fax: +86 10 85861800
Contact: hydrotect@toto.com.cn
1#Zhubang 2000 Business Center 100# Building Balizhuang Xili
Chaoyang District Beijing P.R.CHINA 100025
http://www.toto.com.cn/

USA
TOTO USA INC
Phone: +1 770 282 8686 Fax: +1 770 282 8698
Customer Service: +1 888 295 8134
Contact: hydrotect@totousa.com
1155 Southern Road, Morrow, GA 30260 USA
http://totousa.com

JAPAN / other countries
TOTO LTD. Green Building Material Division
Phone: +81 3 5451 1073 Fax: +81 3 5451 0366
Contact: toto_hydrotect@mb.toto.co.jp
2-4-2, Sakurashinmachi, Setagaya-Ku, TOKYO 154-8540 JAPAN
http://hydrotect.com

■HYDROTECT global partnership site "HYDROTECT.com" > <http://www.hydrotect.com>

TOTO



HYDROTECT