

Suminoe Textile Group Environmental Report 2014

Management concept

Company purpose

We contribute to the improvement of society through production, sales of good products and prosperity of business.

Company motto

We pride ourselves as a pioneer in the interior design and furnishing industry and persist in the spirit of cooperation, sincerity and resolution.

We put our management concept into practice on a daily basis and maintain high ethical standards in all aspects of our business operations, so as to continuously enhance Suminoe Textile's profile as a leader in its industry.

We have drawn up the Code of Conduct set out below to serve as the core principles of our compliance-based management, for observance by all officers and employees of the Company as individuals, and by the Company itself as a collective body.

Code of Conduct

- 1 We comply with all laws and social norms and conduct corporate activities in an impartial and ethically sound manner.
- 2 We contribute to the advancement of the community through the production and sale of good quality products.
- 3 We treat all employees of the Company fairly, act with due respect for their individual personalities, and place high importance on their health and safety.
- 4 We place high priority on maintain good relationships with all our stakeholders.
- 5 We make proactive contributions to the community, as expected of a good corporate citizen.
- 6 We take very seriously the impact of our business activities on the global environment, and contribute to environmental preservation initiatives.

Environmental fundamental philosophy

Recently deterioration of global environment has rapidly progressing.

It is a mission in common among human beings who live on earth to make efforts to preserve and improve global environment and hand the beautiful earth to our descendants.

Suminoe Textile Co., Ltd. well recognized this fact, will make a comfortable and rich society with a cooperation of all the employees positively tackling with environmental preservation activity.

Guideline on activity

In carrying out environmental conservation activities

- 1 We will positively promote energy-saving, resource-saving, recycling with a consideration not to contaminate environment in all of our business activities.
- 2 We will try to preserve environment through products' life cycle from production, sales to disposal by developing environment-friendly technology and products.
 1. Development of technology for energy-saving and resource-saving
 2. Development of recycling technology and recycling system
 3. Development of products and technology to replace materials which would put less load on environment and have more safety.
 4. Development of product which could improve environment and contribute to health and comfort.
- 3 We will try to live together with community through close communication and all employees will start action from whatever one can do.
- 4 We will try to maintain internal system to promote environmental protection and enhance environmental consciousness of all employees.



Efforts for developing technologies

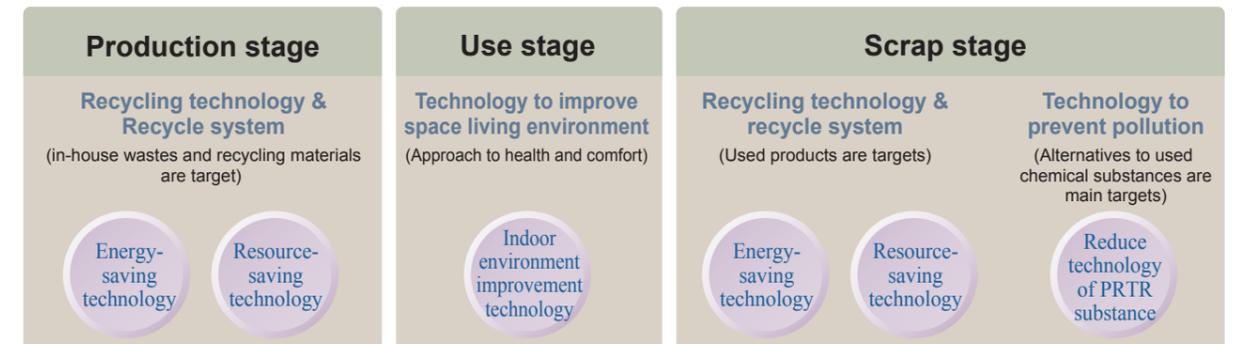
We always try to improve technologies based on the training of human resources so that we can reduce a load on environment throughout the life cycle from the production, use to scrap of products, and contribute to forming the sustainable society by harmonizing with nature.

While the development of technology to prevent public pollution or reduce a load on environment at the production stage was the main target so far, we are now tackling with the development of technologies not only to reduce a load on overall environment such as production, use and scrap stages, but also improve the environment of living space and offer products which could bring safety, security, health and comfort to people.

In this way our company is contributing to the society through "Environmental power" which is one of strong points of the company to develop products with low environmental impacts and low carbon-dioxide emissions for the achievement of the low carbon society.

Furthermore, our company has been participating in FY2011-2014 Project "Green Sensor Network System Project" of New Energy and Industrial Technology Development Organization (NEDO).

● Environmental technologies which Suminoe Group is approaching



Collaboration of academia, industry, and government for product development

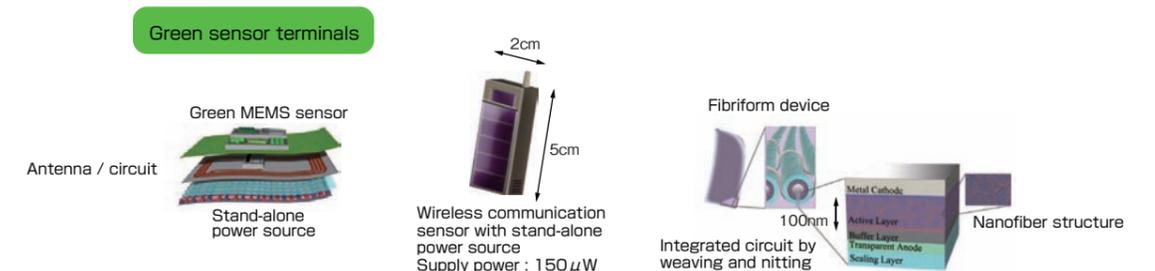
NEDO Green Sensor Network System Project※

Purpose: To develop revolutionary new sensors that incorporate wireless communication function, stand-alone power source function and ultra-low power consumption functions (thereby resolving three issues common to all of the sensor devices used in the sensor networks) and introduce sensor networks to demonstrate energy-saving effects, through visibility (environmental monitoring, determining energy consumption, etc.) and optimization (controlling energy consumption).

Our company has been participating in the working group of development of green sensor terminals.

※NEDO Joint research project (FY2001-2014) with other 20 companies and R&D Organizations

- ① Development of green MEMS sensors
Current and magnetic field (electrical energy), dust and gas (CO₂/VOC) concentration (air conditioning and ventilation), infrared array (human presence, motion and ambient temperature sensing) electric generating and storage module
- ② Development of green sensor terminals
Sensors the size of band-aids (2 cm × 5 cm), mounted on flexible substrates; electrical generating module with indoor ambient lighting and its storage module; ultra-low power consumption analog energy management circuit; simultaneous multiple access (reception from 1000 terminals simultaneously) / high sensitive receivers.
- ③ Development of green sensor network system
Construction of a network system in the laboratory and verification of energy-saving effect.



Greetings

Taking on New Challenges Toward a Recycling-Oriented Society

The change of the Japanese government has been followed by the introduction of new economic policies. With this background, the Japanese economy is now recovering and Japanese companies' business results are also improving. However, the increased use of thermal power due to the halt of nuclear power plants in Japan has produced stagnation in the country's efforts to reduce greenhouse gas emissions. While various countries at COP 19 announced new reduction targets, Japan was left behind. There is no denying that the country lacks a forward-looking perspective. It is necessary to demonstrate a more positive attitude on the international scene and establish more challenging targets.

In December 2013, we celebrated the 130th anniversary since our founder launched his business and the 100th anniversary since our company was established. A little while after the founder initiated the business, his carpets and some other products began to be used for Western-style buildings representing Japan at the time, followed by their use for domestic trains. In addition, since the dawn of the automobile age, our products have been playing an important role in the development of the auto industry. We also have contributed considerably to the widespread use of carpeting for general households. In 1971, we established the largest pollution-free carpet plant in the East in those days in Nara. We went on to launch

sales of SUMITRON® (fiber made from recycled PET bottles) and ECOS® (eco-friendly products with up to 77% recycled material content). Thus, under the theme "Resources for the future," we have been leading the interior industry and actively promoting efforts to manufacture environmentally friendly products.

In preparation for the next 100 years, we have established Suminoe Nakacho Device Technology Corporation, a joint firm with Nakamura Choukou Co., Ltd. On September 1, 2013, the new company launched a business related to solar battery manufacturing.

The renewable energy market is expected to grow both domestically and internationally. Through the new company, we would like to enter the manufacturing field of silicon wafers for solar batteries, whose wide use is expected to grow even more significantly, and develop this business as a new business pillar.

Inheriting an enterprising and pioneering spirit from our predecessors, we will continue to further improve our recycled products that we have produced so far. Moreover, regarding our new initiatives in the solar battery business, we will work on generating clean energy, thus contributing to a recycling-oriented society.

January 2014

Ichizo Yoshikawa
President
Suminoe Textile Co., Ltd.

Environmental-friendly technology and products

ECOS® ECOS Recycled Carpet Tiles

Resources for the future



ECOS is the first product to obtain new Eco Mark certification criteria.

ECOS has achieved post-consumer recycled material ratio of up to 77 percent and reduced a higher amount of CO₂ emission than Suminoe's existing products by 40 percent or more in the LCA assessment.

Suminoe Textile Co.,Ltd. and SUMINOE Co.,Ltd began production of ECOS recycled carpet tiles made from high ratio of recycled PVC material developed with Sumitomo Corporation and Refineverse Inc. and aim to realize the resource recycling.

New Eco Mark certification criteria

The criteria of Eco Mark product category No.123 (Building Products Version 2 C-7 Tile Carpets) newly adopt the concept of "horizontal recycling", requiring the collection system of waste carpet tiles and the use of post-consumer materials derived from waste carpet tiles at a rate of 10 percent or more of the total product mass.

The strong points of ECOS are as follows,

- ① Recycled material ratio of up to 77 percent, far superior to New Eco Mark Certification Criteria. first product acquired the new certification criteria.
- ② Maximum CO₂ emissions reduction rate of 43% in the LCA assessment of Mizuho Information & Research Institute, Inc.
- ③ The same cost performance level as virgin tiles.
Collecting of carpet tile wastes ⇒ recycling materials ⇒ producing and selling of recycled carpet tiles ⇒ Usage ⇒ Collecting ... ECOS's concept is "Resources to the future" and makes ECO value chain.

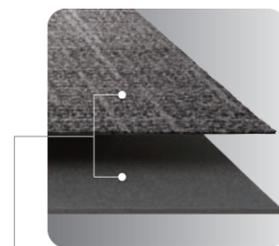


ECOS LX-1600

SUMINOE started to produce ECOS series (27 marks, 289 items) from July 15, 2011 and will apply ECOS to all of its carpet tiles.

Following the key phrase "Resources for the future," we intend to play a leading role in helping establish a sustainable society as a pioneer interior maker.

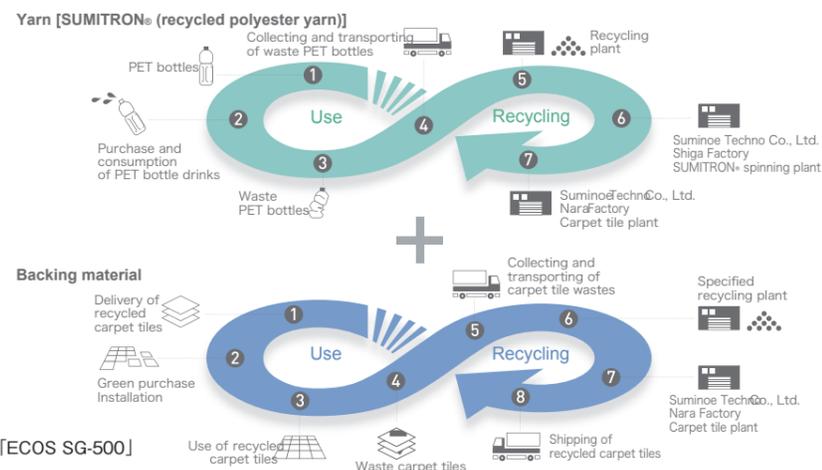
ECOS® ECOS Double Recycle System



Both the surface and backing materials use recycled materials.

ECOS® Recycle System

[ECOS SG-300-300TF], [ECOS SG-400], [ECOS SG-500]



Suminoe's Tile Carpet "Ecos" Win Bronze Prize at Eco Mark Awards 2012

Suminoe Textile Co., Ltd. received the bronze medal at Eco Mark Awards 2012 for their project under the theme of "Development and Popularization of Horizontally Recycled Tile Carpet Series Ecos" from the Eco Mark Office of the Japan Environment Association. At the awards ceremony held at Tokyo Women's Plaza on February 6, 2012, we received the prize and comment shown below from the Office. (The full text of the comment is cited below.)

"Suminoe Textile Co., Ltd has actively advanced the horizontal recycling of used tile carpets into new ones. Today, they provide 220* kinds of carpets that are made of used carpeting. We greatly appreciate their philosophy of product development; 'regardless of the customer's feelings about the environment, they can be eco-conscious only by choosing Suminoe's product.' Moreover, as a result of efforts to increase the percentage of recycled materials contained in this product to the world's highest level of 70%, the product's environmental performance was substantially reinforced. This product exhibits outstanding material recycling."

* The number has increased to 289 as of October 2013.



Logo of Eco Mark Awards 2012

Tile Carpet "Ecos" Receives "Green Label Plus" Certification

Suminoe Textile Co., Ltd. was granted certification by the Green Label Plus program of the Carpet and Rug Institute in the US on November 12, 2012. Green Label Plus is a certification program to measure the emissions of 13 volatile substances including formaldehyde that impact the indoor environment, and grant a certification to carpets meeting rigorous criteria. Using tile carpets certified by Green Label Plus earns one point under the Leadership in Energy and Environmental Design (LEED), a rating system of the performance of green buildings in the US.



Certification mark for Green Label Plus

Advertisement for Tile Carpet "Ecos" Wins Best Construction Award at Nikkei BP Advertising Awards

In 2013, Suminoe Co., Ltd. won the Best Construction Award at the 19th Nikkei BP Advertising Awards (hosted by Nikkei Business Publications, Inc.) for its advertisement of its recycling-oriented tile carpet "Ecos" series. Suminoe's advertisement was selected from among about 10,000 advertising pages from 2,976 companies. Professor Fumio Seki of Nihon University commented: "the persuasive effect of figures and well-composed photographs give the design of this advertisement a depth to which audiences are naturally attracted."



Advertisement in the January 10, 2012 issue of Nikkei Architecture

Tile Carpet "Ecos" on Permanent Exhibition in Eco-tech-kan at Kyobashi Environment Station

A showroom of environmental technology, "Eco-tech-kan" opened at Kyobashi Environment Station on the sixth floor of the large environmentally friendly multi-purpose building Tokyo Square Garden in Kyobashi, Tokyo on Tuesday, July 16, 2013.

Coinciding with the opening of Eco-tech-kan, Suminoe Co., Ltd. launched a permanent exhibition mainly composed of its recycling-oriented tile carpet series "Ecos" for use as a showroom.

Following the theme of "top-class eco-conscious technology" raised by the exhibition zone and the entire building, Suminoe's Ecos series exhibition introduces the manufacturing processes and completed products of its original polyester yarn Sumitron® made of recycled PET materials, and tile carpets made of recycled packing materials from used tile carpets removed from the market.

- Location: 6th floor, Tokyo Square Garden, 3-1-1 Kyobashi, Chuo Ward, Tokyo
- Opening hours: 10:00 a.m. to 5:00 p.m. weekdays* (*Building is closed Saturdays, Sundays, holidays and year-end and New Year holidays.)



Exhibition in Suminoe's booth

Deodorant processing technology "Triple Fresh®"



Suminoe's Triple Fresh, which keeps evolving with the changing times

Almost 15 years have passed since the deodorizer Triple Fresh was developed. Triple Fresh gets rid of odors by adsorbing formaldehyde, a key culprit of sick-house syndrome, cigarette smell, and other odors generated daily in our living environment and decomposing them into harmless substances. This advanced deodorizing technology is applied to curtains, carpets and cloth, highly appreciated as a standard of health- and eco-friendly products. We promise to advance our technology further.

- 1995** ● Suminoe establishes a product development meeting to provide new value.
- 1996** In March, the Ministry of Welfare establishes an investigative committee for comfortable and healthy residents. In July, the Ministry of Construction, Ministry of International Trade and Industry, Ministry of Welfare, construction-related industrial associations, experienced academics and other relevant organizations and people jointly establish the Healthy Resident Research Group for investigation and research into reducing indoor air pollution.
- 1997** In June, the Ministry of Welfare releases a guideline value (0.08 ppm) for formaldehyde concentration in indoor air.
- 1998** In March, the Healthy Resident Research Group designates 3 materials and 3 agents including formaldehyde as items needing special treatment.
 - Suminoe releases Triple Fresh® (TF), a product for deodorizing formaldehyde, cigarette smells, and other malodorous substances generated in daily life.
 - TF attracts attention as a product for controlling sick house syndrome.
 - An increasing number of hotels and public facilities employ TF as part of their hospitality services.
- 2000** In April, the Ministry of Welfare establishes the Council to Study Sick House Problem. In May, the Ministry of Economy, Trade and Industry establishes the Act on Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (the Green Purchasing Law). In August, the Ministry of Welfare and other four ministries jointly establish the Indoor Air Countermeasure Investigation Committee and start nationwide research on actual indoor air conditions in Japan.
 - Suminoe releases Triple Fresh® Plus, which has the ability to deodorize odors bothering caregivers such as the smell of aged persons and odors of urine, feces and sweat, as well as all the benefits of the original TF.
 - TF Plus becomes popular in hospitals, care homes and welfare facilities.
- 2002** In February, the Ministry of Education, Culture, Sports, Science and Technology revises the Standard for School Environment and Hygiene and provides standards for investigation and judgment of the levels of formaldehyde and other substances in the school environment.
 - Suminoe develops the innovative deodorizing technology "Triple Fresh® Bio," in which synthetic enzymes are applied to deodorant filters for refrigerators.
 - A German manufacturer begins using TF in their products.
 - A Japanese major automotive manufacturer begins using TF sheets in their products.
- 2003** From January to March, the means to express the levels of chemical substance emissions of building materials in JIS and JAS products are integrated and the strictest rank of "F four stars" is established. In May, the Health Promotion Act is established and enacted to prevent passive smoking. In July, the Building Standards Act related to countermeasures against sick house syndrome is revised.
 - The new deodorizing technology Triple Fresh® VOC is developed with visible responding photocatalyst technology. This product is employed in an open-to-public project of the New Energy and Industrial Technology Development Organization (NEDO).
 - The world's third largest carpet manufacturer begins using TF in their products.
 - A major automotive manufacturer begins using TF sheets in their products.
 - Suminoe releases a home deodorizer for refrigerators with super deodorant effect.
- 2005** ● "Air Cleaning Wallpaper TF-V" is released, enabling an entire roomful of air to be cleaned with TF series products.
- 2007** ● A new product produced by adding the antibacterial function Ag+ to Triple Fresh Bio deodorant sheets is employed by two refrigerator manufacturers.
- 2008** ● "Triple Fresh II" is developed, with double the deodorizing effect.
- 2010** ● "Air Cleaning Wallpaper + Plus Care," which was produced by adding deodorizing effect for odors bothering caregivers to the Air Cleaning Wallpaper TF-V.
 - Triple Fresh Bio is launched as a home deodorizer with the concept of "Real odor deodorization without disguising with a scent (Tispa Series)."
- 2011** ● The resistance of deodorization filter "Triple Fresh Bio" against tobacco odors is enhanced to endure for 10 years. This product is employed by a major air cleaner manufacturer.
- 2012** ● Triple Fresh is employed for curtains and cloth seats on the Kintetsu Limited Express "Ise-Shima Liner."

Triple-Fresh®·Triple-Fresh®II treatment technology

Triple-Fresh® series, which absorbs and decomposes formaldehyde, cigarette smell and four major household odors, has been evolved.

- Triple-Fresh®II treatment
- ① Ability to absorb and decomposes pet odor is added.
 - ② Ability to kill formaldehyde has become two times stronger than Triple-Fresh® treatment.

It not only absorbs odors simply, but chemically decomposes into harmless ingredients as water and carbon dioxide using oxygen in the air (24 hour cycle odor-killing system). As a result, it will release odors very little. In this way, we can offer interior decoration products with excellent function.

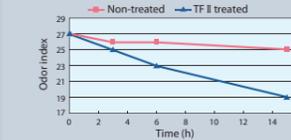
Triple-Fresh®·Triple-Fresh®II treatment are used in carpets, curtain fabrics, wallcoverings, automobile interior fabrics, etc. In 2012, it is adopted to the three types wall protection materials in the elevator (carpet, nonwoven and film) and expected to contribute to the environmental improvement of the collective housing shared zone.



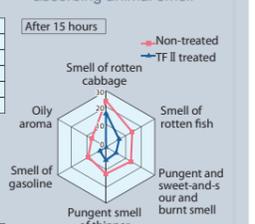
Deodorizing headliner : MAZDA PREMACY

Mechanism & performance

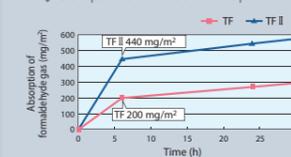
Time course of odor index absorbing animal smell



Odor contribution rate of absorbing animal smell



Comparison of deodorant power

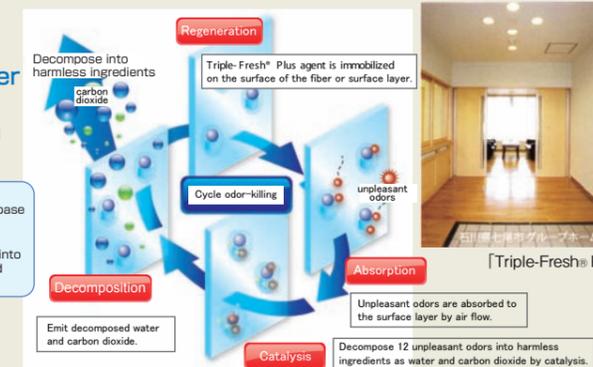


Deodorizing curtain・moquette : Kintetsu Railway "Ise-Shima Liner"

「Triple-Fresh® Plus treatment」 wallpaper

Safe and secure functionality wallpaper more strong deodorization function

- TF nitrogen compound Absorb and decompose aldehyde-base substance
- TFPlus metal salt Decompose 12 unpleasant odors into harmless ingredients as water and carbon dioxide by catalysis.



「Triple-Fresh® Plus treatment」 wallpaper

「Triple-Fresh® Bio treatment」

Triple-Fresh® Bio" is developed on new concept processing technology to make artificial enzyme supported on a special corrugate. It quickly attracts bad odors by an absorbing function with quick effect and decomposes bad odor (sulfur odor) continuously with the aid of catalysis of artificial enzyme. It can maintain quickly effect and long durability and not require energy, then it can be used deodorizing filter mainly for home appliance products as refrigerator for 10 years.

The removal period of the bad smell of aldehyde is much more longer by the improvement of filter base material and chemical absorption agent.

Application to air conditioner was attained by the fire-resistant performance.



Deodorizing air filter for air cleaner



Ceramic fan heater



Refrigerator



Air freshener "Tispa series"

Environmental-friendly technology and products

Products acquired Eco Mark 361 items of Carpet, Curtain and eAccess-floor "SE-Light N" have acquired Eco Mark.

The Eco Mark program which the Japan Environment Association undertakes, is managed in accordance with the standard and principle (ISO 14020, ISO 14024), a type I environmental-label display.

The Eco Mark is applied to the products with low environmental impacts and useful for environmental conservation through the whole life cycle as "from cradle to grave".

It depends on the product group such as the carpets and curtains about the recognition standard, and the reproduction material mixing rate standard is different respectively.

It is not a throw-away product, "It is displayed that it is easy to recycle", and "Severe standard to the poisonous substance", etc. are provided besides the reproduction material mixing standard.

Suminoe receives recognition in the field of the carpet tile, roll carpet, piece carpet, rug carpet and the curtains, and will increase in the future.

Products line up

- Recycled Carpet Tile [ECOS®] (289 items)
 - Curtain [mode S Vol.6] [face Vol.18] (40 items)
 - Roll carpet [CARPET Concierge Vol.3] (12 items)
 - OA floor [SE-Light N/NK] (6 items)
 - Rug carpet [HOME® 2013-2014] (30 items)
-Total 377 items as end of October 2013.



ECOS LX-1900

Eco-fabric with Eco Mark

Fabric corresponding to "Green Purchasing"

We offer "Eco-fabric" with Eco Mark using recycled yarn as seat fabrics of railway vehicles or buses. (Certificated No.03105015)

In recent years, sales quantity is increasing with a rise of the purchase consciousness of eco-friendly products.

*Eco-fabric with Eco Mark : Recycled yarns are used 50% or more.



Eco-fabric: Keihin Kyuko Bus

Designated procurement goods by Law on Promoting Green Purchasing 824 items are registered in curtain and carpet section

Suminoe takes part in "Green Purchasing Network(GPN)", a network among industries, administration and consumers, which was established to promote Green Purchasing. GPN sets up a guideline as "reclaimed polyester 25% or more (weight ratio of the product)" in interior furnishing products as equipment materials and officially announces them as "Designated procurement goods by Law on promoting Green Purchasing". Suminoe has registered 824 items in this "designated products". Suminoe positively promotes Green Purchasing by showing mark on these products.



E-3381(face Vol.18)

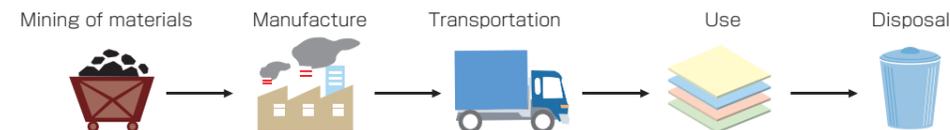
Products line up

- Recycled Carpet Tile [ECOS®] (289 items)
 - Curtain [mode S Vol.6] [U Life Vol.7] [face Vol.18] (255 items)
 - Roll carpet [CARPET Concierge Vol.3] (12 items)
 - Hard Floor [SUMIRIUM] [SUMIMAT] etc. (234 items)
-Total 790 items as end of October 2013.

Environmentally consciousness of products valued through LCA

LCA is ...

LCA is known as "cradle-to-grave analysis". It is a comprehensive, quantitative assessment on the environmental effect of entire life cycle of the product from its gathering of materials, manufacture, transportation, use, to disposal.



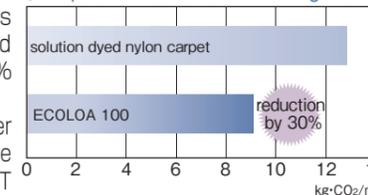
[ECOLOA 100]

ECOLOA 100 reduces 30% CO₂ emission

ECOLOA 100 is the industry's first rolled carpet product which has acquired the Japanese Eco Mark and has reduced CO₂ emission by 30% than solution dyed nylon carpet.

It makes use of Sumitron® (polyester yarn) that contains 60% or more reclaimed materials from recycled PET bottle.

● Comparison of CO₂ emission/m² through LCA.



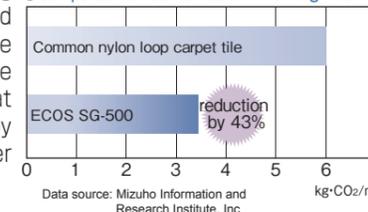
ECR-101/ECR-104

[ECOS SG-500]

Sustainable recycled carpet tile ECOS SG-500 has reduced 43% CO₂ emission.

ECOS SG-500 series are epoch-making carpet tiles containing recycled material both in the surface pile Sumitron® and recycles PVC in the backing, and certified products that meet the criteria of "Eco Mark" by containing 74% of post-consumer material.

● Comparison of CO₂ emission/m² through LCA.



SG-502/SG-504

Car seat fabrics using bio-mass derived fiber.

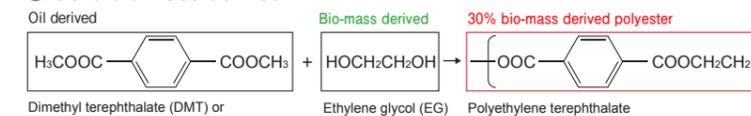
Bio Master

Among concerns about the depletion of oil resources, many car seat fabrics using bio-mass fibers have been proposed. But no bio-mass derived fiber could have been replaced easily with oil derived PET fibers. Suminoe Techno Co.,Ltd. has developed "Bio-Master", the seat surface material which is using the sugar cane derived fiber which can be replaced immediately with oil derived PET fiber without any concern in the physical properties.

features

1. It has equal potential (yarn structure, performances) as oil derived PET fabrics, and can create design and texture as wanted.
2. It excels to other bio-mass seat fabrics in productivity and cost performance.
3. It can contribute to reducing CO₂ emission and load on environment.

● 30% bio-mass derived PET



bio-mass derived EG → 30% bio-mass derived PET



- Production process of Bio Master is same as that of oil derived PET and shows no difference in performances.
- Bio Master can be verified by radiocarbon dating.
- It can acquire "Biomass PlaMark" of Japan BioPlastics Association and "Biomass Mark" of Japan Organics Recycling Association.

Comparison of performances of bio materials

| | oil derived PET | Bio Master | Bio PTT | PLLA |
|--------------------|-----------------|------------|------------------|-------------------------------------|
| melting point | 255°C | 255°C | 230°C | 170°C |
| degree of bio-mass | 0% | 30% | 35% | 100% heat & light resistance |
| concerns | - | - | strength decline | strength decline & light resistance |



NISSAN LEAF

Environmental-friendly technology and products

Olefin floorcoverings and constructional materials

With a purpose to reduce a load on environment, we are now developing processing technology for new-generation floorcoverings and constructional materials by adopting olefin resin where PVC is mainly used. We have developed "OH FILM S" which is easy to be installed and has an anti-slippery function to follow olefin tile "OH TILE" and olefin long sheet "OH SHEET S".

They are adopted in railway vehicle area and are expected as future products.

Following features are realized by technology development.

- ☆Safety It generates little toxic gas at incineration as the material is olefin. It is authorized as flame-retardant in flammability test for railway vehicle materials.
- ☆Anti-slippery It is used at the entrance of railway vehicles due to its anti-slippery function.
- ☆Durability It has an excellent wear durability.
- ☆Anti-pollution It is very hard to be polluted by pollutants as oil or chemicals.
- ☆Easy installation It is easy to be installed in a short time as special adhesive is applied on back face.
- ☆Design As the mat itself is transparent, various designs are available by printing.

▶ Safety function

◆ Comparison of combustion (ppm)

| Item | Polyolefin flooring | PVC flooring |
|-----------------------------------|---------------------|--------------|
| Carbon Monoxide (CO) | 123 | 267 |
| Hydrocyanic acid gas (HCN) | No detection | 11 |
| Hydrogen Chloride (HCl) | No detection | 100 |
| Hydrogen Fluoride (HF) | No detection | No detection |
| Sulfur Dioxide (SO ₂) | No detection | No detection |

◆ Slip resistance Tester



The above chart shows the range of CSR* under various conditions with men's soft sole shoes.

*CSR stands for Coefficient of Slip Resistance, which is a coefficient to evaluate slipperiness and it evaluates safety against slipperiness in walking.



OH TILE® Toshiba Elevator

◆ Comparison of smoke generation (Ds)

| Polyolefin flooring | PVC flooring |
|---------------------|---------------------|
| After 4 minutes 62 | After 4 minutes 171 |
| Maximum value 122 | Maximum value 171 |

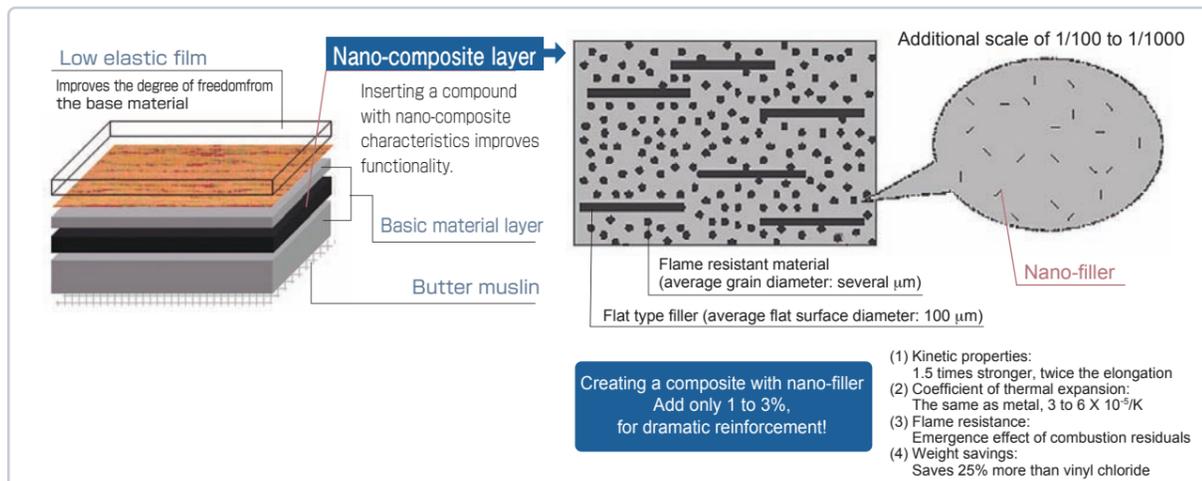
Highly functional flooring with olefin nano-composite technology

▶ Highly effective using only a minute amount!!

Ordinarily, when creating a highly flame resistant and abrasion resistant property to olefin resin floor material, either its weight per unit area or rigidity increases, making the floor material itself harder. This may cause dimensional instability caused by heat.

To solve these technological problem, we've developed a technology that creates a compound layer by applying just a small amount of scattered specific nano-size filler.

By integrating this nano-composite layer in floor material, we've created a dramatic effect.



Polyolefin display film

OH Film S7P (for railway vehicle)

It has been adopted as entrance anti-slip material for railway vehicle required high level of safety.

- Environment : Less poisonous gas HCN,HCl
- Safety : High anti-slip and durability under the wet & dry condition.
- Gentleness : Display by print "NOTICE" "GUIDANCE" "ATTENTION"



OH Film S7P: Wheelchar area Transportation Bureau, City of Yokohama

OH Film B (for Bus)

It has been adopted as a warning film for accident prevention in the bus. Using aluminum base layer, It can be easily glued not only to the flat floor but rough floor.



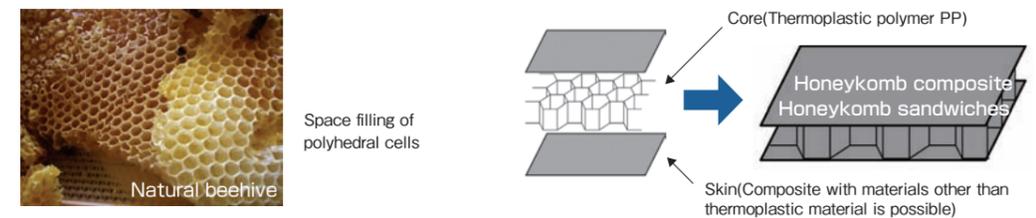
OH Film B:HANKYU BUS

Fire-resistant honeycomb structure "SUMIHONEYCOMB"

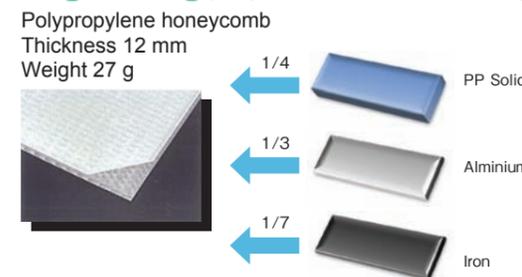
The structure which is lightweight and has intensity was developed by kneading a Suminoe's special nano-size fire-resistant filler to the honeycomb structural body of the thermoplastic polymer.

▶ Honeycomb structure

Intensity is not spoiled but required material can be reduced. ⇒Most outstanding structure



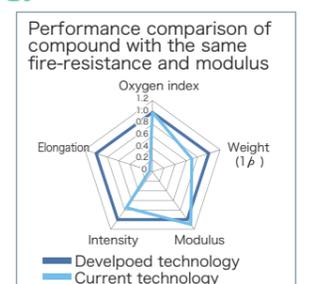
▶ Weight saving (Comparison with the same flexural rigidity)



▶ Suminoe's technology of flame retardant

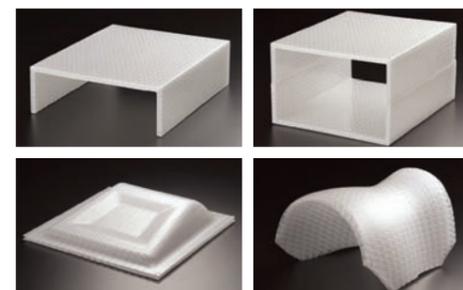
Current technology
A lot of inorganic fire retardant in the PP polymer
⇒Falling of dynamic characteristic or processability

Developed technology
Chemical fire-resistance mechanism and formation of the layer which intercept fire.
The small amount of nano-size fire-resistant filler.
⇒Realization of fire-resistant material with safety and high performance.

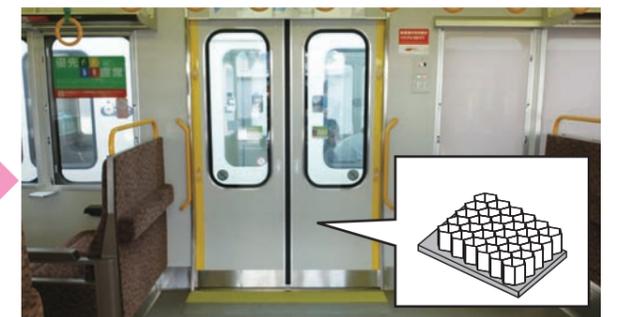


▶ Second process of PP honeycomb structure body

3-dimensional processing (Bending, Press, Welding) is possible by the characteristic of thermoplastic.



▶ Application of "SUMIHONEYCOMB"



Core material of railway vehicle door

Environmental-friendly technology and products

ECOな生活 ECO na seikatsu (ECO Life) curtain

Clear label of the energy-saving effect of the curtain

▶ About 25%*1 of home energy is consumed by air-conditioners.

Openings (Windows) of the housing serve as lighting, sunshine, draft ventilation and viewing. Energy-saving measures are also required for windows all year round to get comfortable indoor environment.

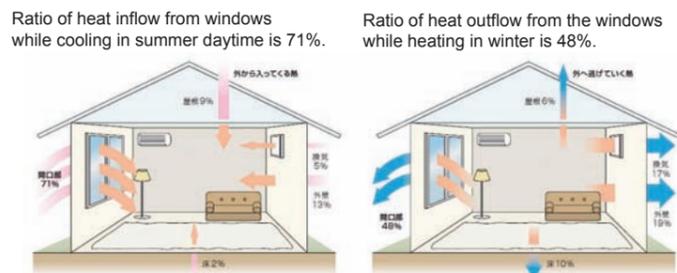
71% of heat inflow from outside come home from windows while cooling in summer daytime, and 48% of heat outflow to outdoor go out from the windows.

Reduction of these heat flow is main measure of energy-saving. You can save energy cost by switching to thin curtain in summer and block heat inflow from outside and thick curtain in winter and block heat outflow to outside.

LESCOM-Suminoe simulation program can calculate energy-saving performances of Suminoe's all curtains. Please use it as a new standard for selecting curtain.

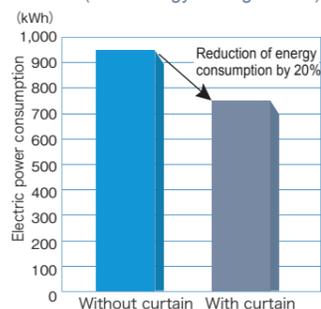
*1 Data source : Agency for Natural Resource and Energy FY2004 summary of electric power supply and demand

Reference
 ※ Heating condition (period and temperature set point)
 Energy-saving product catalog 2009 published by The Energy Conservation Center, Japan
 ※ Heating electric power consumption
 Calculated by transient heat load calculation program in multiple rooms "LESCOM-Suminoe" Coefficient of Performance COP=2.5
 ※ Electric power cost
 22Yen/kWh FY2004 Home Electric Appliances Fair Trade Conference
 ※ CO₂ emission(kg)= electric power consumption(kWh) × 0.373(kg/kWh)



Annual energy cost is saved by 4,000 yen and annual CO₂ emission is reduced by 70 kg.

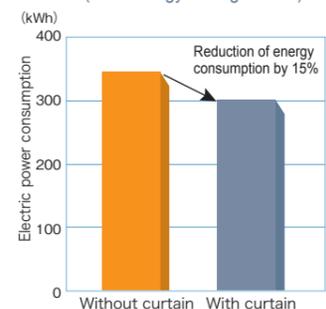
Thin curtain with high insulation effect (20% energy-saving curtain)



Cooling period : Jun.2 ~Sept.21 (112 days)
 Cooling setting temperature : 27°C (operation time 6:00-24:00)
 Open and close time of the curtain : close all day

Annual energy cost is saved by 1,100 yen and annual CO₂ emission is reduced by 20 kg.

Thick curtain with high heat-retaining effect (15% energy saving curtain)



Heating period : Oct.28 ~Apr.14 (169 days)
 Heating setting temperature : 20°C (operation time 6:00-24:00)
 Open and close time of the curtain : open from 7:00 to 17:00

Curtain can save heating and cooling energy loss and monthly utilities. Suminoe indicate 4 class of energy-saving performance for all curtain. Please use as a new standard for selecting curtain.

数字が大きほど省エネ効果が高く、冷暖房の効果を4段階で表示しています。

- Heating effect for thick curtain, Bigger value means higher energy-saving
 ▼15% ▼10% ▼5% ▼4%以下 or less
- Cooling effect for thin curtain, Bigger value means higher energy-saving.
 ▼20% ▼15% ▼10% ▼9%以下 or less



▲ U-6005 : Sample curtain of cooling energy saving 10% and heating energy saving 15%

Products line up

•Curtain [mode S Vol.6] [U Life Vol.6] [face Vol.7]

Antibacterial and antimold SUMITRON® AM yarn

Antibacterial, bacteriostatic, odor-resistant, antimold functions are added to SUMITRON® yarn used as carpet pile yarn.

It has an effect which suppress dermatophyte at the time of water use. It has a bacteriostatic function in medical spot and it can maintain clean environment.

SUMITRON® AM has aquired SEK (Green, Red, Orange, Blue) Mark of JTETC(Japan Textile Evaluation Technology Council).23-3



Bath Mat

Anti-allergen fiber processing technology

Aller-Block® Wallpaper, Curtain, Carpet

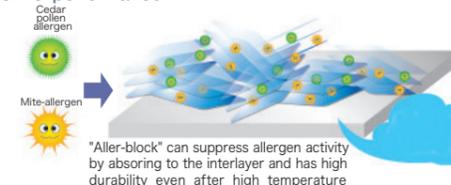
"Aller-block" was developed to give a new function of anti-allergen to wallpaper.

"Aller-block" can suppress allergen activity by absorbing to the multilayer structure made from inorganic materials from natural mineral and has high durability even after high temperature treatment.

Products line up

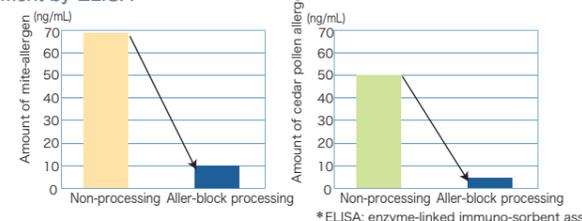
- Rug [SUMITRON® GLAIN] [SUMITRON® HARMONY] [NEOGLASS] [SUMITRON® DUO] [LAX FUR] [GLASS WEB] [SHARON]
- Piece Carpet Collection [Piece® Vol.2]
- Wall paper [Anti-allergen wallpaper Aller-Block®]
- Curtain [U Life Vol.7] [face Vol.18]

Mechanism & performance



"Aller-block" can suppress allergen activity by absorbing to the interlayer and has high durability even after high temperature

Assessment by ELISA*



R6009(Anti-allergen wallpaper Aller-Block®)

Antiviral function fiber processing technology

Effective against the virus! ※1 Protect your family from virus by curtain and carpet. ※2

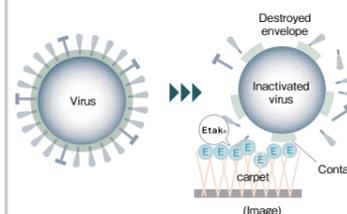
CLEANSE

Joint study of KURABO and SUMINOE applied CLEANSE® to curtain and carpet.

Antiviral function fiber processing technology [CLEANSE®] is the effect on virus have been confirmed. [Etak®] developed by Hiroshima University immobilized antimicrobial component based that is used for cleaning of oral cavity. CLEANSE® is the processing technology that strongly immobilized on the surface of the fiber.

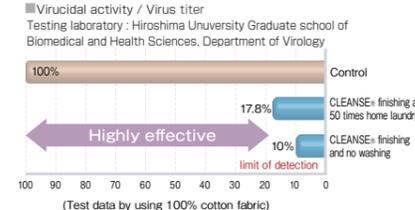
Immediate effect

Unaffected by environment and weather. Reduce the risk of spreading of virus with envelope after CLEANSE® finishing.



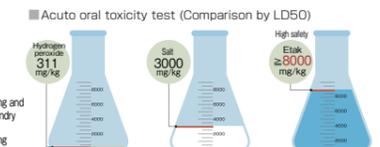
Durability

Maintain a high level of durability and sustainability while maintain the texture of the material. Virus titer is more than 90% in virucidal activity test.



Safety

High safety made from anti-microbial dental cleanser. Extremely high level of safety has been demonstrated by Mutagenicity, Acute oral toxicity and Skin irritation test.



| Mutagenicity test | Mutagenicity | Negative |
|---|-----------------------------|---|
| Acute oral toxicity test with female mice | LD ₅₀ ≥8000mg/kg | No abnormality was observed in the mice |
| LD50/ Lethal dose that causes the death of half of the test animals in a given amount of time. The higher the number, the administration of a low hazard. | | |
| Skin Primary irritation test with rabbits | Etak® agent | nonstimulative |
| | Etak® treated towel | nonstimulative |

About Etak

Etak® is immobilized antimicrobial component developed by Professor Hiroki Nikawa (Chair of Oral Health Science, Department of Oral Health Engineering, Graduate school of Biomedical Science, Hiroshima University). Its main component is antimicrobial ingredient based that is used for cleaning of oral cavity.

※1 "Effective against the virus" means to reduce function of virus in contact with the fibers. It does not work on all virus.
 ※2 Antiviral fiber processing technology [CLEANSE®] can reduce the risk of spreading of virus with envelope touching the surface of curtain and carpet. It does not guarantee the prevention of infection in real space.

Products line up

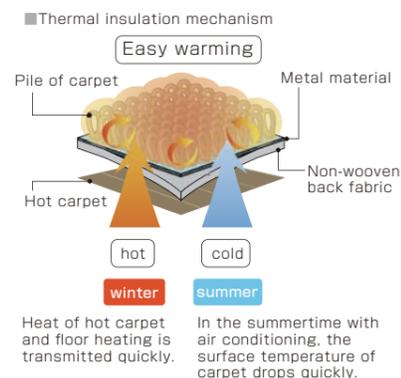
- Rug [GLASS WEB] [SHARON]
- Curtain [U Life Vol.7] [face Vol.18]
- Recycled carpet tile [ECOS iD-4000] [ECOS iD-4100]

Indoor environment improvement technology

Base fabric thermal storage carpet

HOT METAL® Patent pending

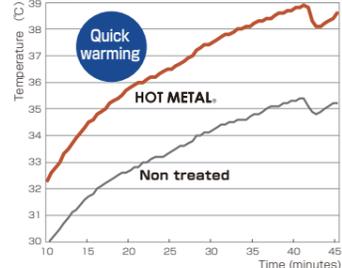
Using the base fabric metal material with high thermal conductivity, heat of hot carpet is transmitted quickly.



Point 1 Quick warming on the hot carpet

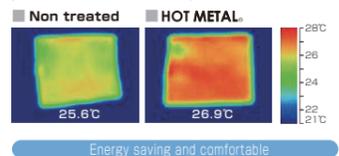
Rapid temperature rising in comparison with the normal base fabric

Hot carpet temperature rising test
Measured temperature rise by carrying treated and non treated carpet on the hot carpet.



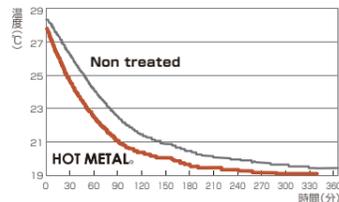
Point 2 Energy saving and comfortable

Thermograph of the surface of the carpet after 1 minute placed the heating plate 34°C on the carpet



Point 3 Excellent temperature controlling all year around

When you turn the air conditioning in the room of the summer, the surface temperature of the carpet become cool quickly more than non treated



Driver's ventilation seat

Suminoe's special seat fabric is adopted for the driver's ventilation seat. Freshing air flow is blown by a fan from the seat surface and the backrest to reduce the heat of summer.

To achieve the driver's ventilation seat in a compact car, the seat fabric itself has a sufficient air permeability, more specifically

1. Air permeability > 150ml/cm²/sec
2. Design representation
3. Combine high durable strength and high permeability are necessary.

Our special seat fabric has a air permeability (180ml/cm²/sec=80% higher than the conventional) and cooldown performance was enhanced significantly.



Air flow image of the driver's seat with ventilation function

Lightweight technology

Durable lightweight polyurethane seat fabric for automobile

Frather-Cloth®

Polyurethane synthetic leather has been increasing as a material to replace PVC leather in recent years. It is finished in soft texture without the occurrence of dioxin compared to PVC leather. By reducing the coating amount of the resin layer (basic fabric layer volume up so as not to reduce the thickness) weight has become 320g/m² (70% compared with conventional). The use of resin durable than conventional, it has to clear the harsh seat durability test. It is the environmental-friendly product in which it is soft and possible to lighten the seat weight.



NISSAN NOTE MEDALIST

Swing-Net® Fabric (3 dimensional knit fabric)

Applying current warp knitting technology, we have developed the most suitable materials and knit construction with an aim to create products which provides cushion capacity. As mono-filament yarn(gut) is used as a yarn which connects knit construction of both surfaces, fabric itself is able to have cushion capacity. So this is a resource-saving product which does not require cushion material when used as upholstery.

Besides cushion material, this is widely used as a car seat material, functional bed, desk partition featuring its comfortness or light weight.



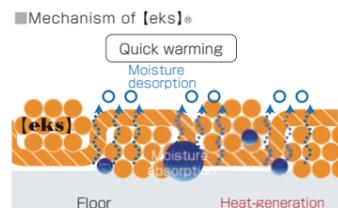
Car seat(Swing Net Fabric) Structure of cross section

High moisture absorbing exothermic fiber carpet [eks]® treatment

Moisture-absorbing heat-generation fiber [eks]®

[eks]®

Fiber itself generates heat by absorbing moisture.

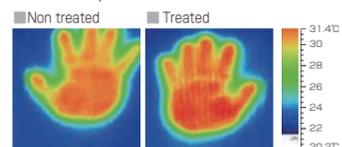


Point 1 Heat-generation fiber

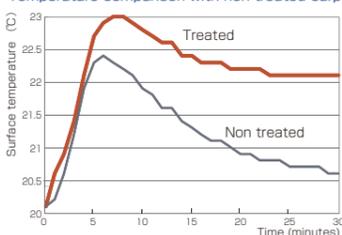
It is a carpet using humidity retention material [eks]® to feel warmly when involved by fiber itself absorbing moisture. Because this product is superior in humidity adjustment, warmth without a feeling of stuffiness is attractive.

Thermograph

Carpet surface temperature measured by thermograph after having put a hand on the carpet surface for five minutes.



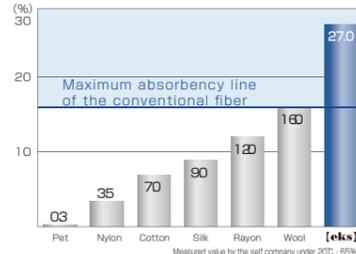
Temperature comparison with non-treated carpet



Point 2 Warm with strong moisture absorbency

It generates heat by absorbing moisture evaporating from a body. Because it has excellent moisture absorption in comparison with other fiber, it will warm sucking moisture strongly.

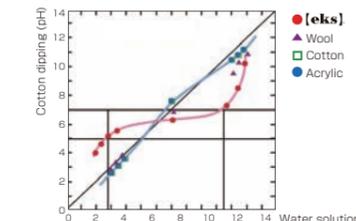
Clear difference in moisture absorption performance



Point 3 Controlled by weak acidity that is kind to skin

pH control function of the fiber to keep weak acidity same as skin protects skin from alkali ingredients such as the sweat easily. Deodorization characteristics and the antibacterial deodorization effect are stronger than other fiber and are available in safe.

Ability for pH buffering of various fiber



Environmental-friendly technology and products

Lamination processing technology (making various sheet film by extrusion molding with wide T-die)

Rubble covering sheet

Covering sheet for temporary rubble occurred in the natural disaster. It suppress spontaneous combustion and has flame resistance, waterproof and deodorant. It has been adopted to put temporary rubble of the Great East Japan Earthquake.



Rubble covering sheet

Special water shield system at disposal site

Total water shield system Barias

Sheet used in the slope and base of waste disposal site is provided with the role to prevent water from the waste penetrating into soil.

Special-treated water shield sheet "Barias" bears this important role in our total water shield system.

As polyester non-woven fabric made from PET bottles is used in the protective sheet, this system is "Eco products" which positively tackles with protection of environment.



Protective sheet at disposal site (Kiyosato, Hokkaido)

Breathable heat shield roofing sheet under roof tile

Asphalt roofing sheet is commonly used for waterproof of roof, but Suminoe produces new type of roofing sheet. It is lighter weight than asphalt roofing and reflect radiant heat from roof tiles warmed by sunlight.

It can control indoor temperature rise and save the air control energy. Moreover the house durability is made stronger by breathable water-proof function.



Breathable heat shield roofing sheet under roof tile

Waterproof weatherstrap sheet

Waterproof weatherstrap sheet for residential aluminum sash and cap piece at veranda.

Waterproof layer (surface)

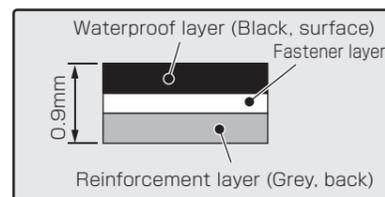
Special waterproof and elastic polymer layer can stop rain invasion and seal the tacker staple hole.

Fastener layer

Functional nonwoven spunbond can fasten tacker staple or screw tight and improve the water resistance of waterproof layer.

Reinforcement layer

Strong nonwoven spunbond can reinforce the entire sheet.



Other technology

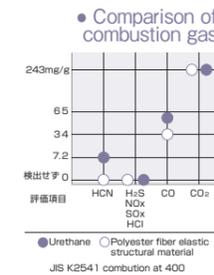
Seat cushion material for railway vehicles

SUMICUBE®

This is the seat cushion material for railway vehicles which are treated special processing of the polyester fiber elastic structural material. Recycling is possible after being used as a sheet for a long time. Our company has established the recycling system which collects used materials and is reused.

Moreover, as compared with the urethane currently generally used as cushion material of a seat, it generates less poisonous gas like cyanogen gas at the fire outbreak, it is a safe material.

It is adopted as JR SANYO KYUSHU SHINKANSEN "MIZUHO" and "SAKURA" as cushion material of a back reclining portion.



JR-CENTRAL "N700A" Green car

Ink-jet printing system

True art system ·Nassenger

"True art" is digital print system using special pigment ink that applies for wall coverings and floor coverings.

"Nassenger" is ink-jet dyeing system that prints digital design on fabric. These systems can produce energy-saving and resource-saving goods that reduce waste water during printing process. And they can produce various products with small lot and full color.

We, Suminoe, apply these systems to apparel, interior goods, seat fabric of various vehicles.



JR-KYUSHU CRUISE TRAIN "SEVEN STARS IN KYUSHU" (Supervised by DON DESIGN ASSOCIATES)

Next generation net for the screen door

CLOTH CABIN®

CLOTH CABIN® is a fine mesh net to prevent an invasion of the pollen and dust. High density weaving of polyester monofilaments can realize this mesh size 80μm (1/160 smaller than conventional products).

The design to set up outside of conventional products prevent an invasion of the pollen more than 80%.

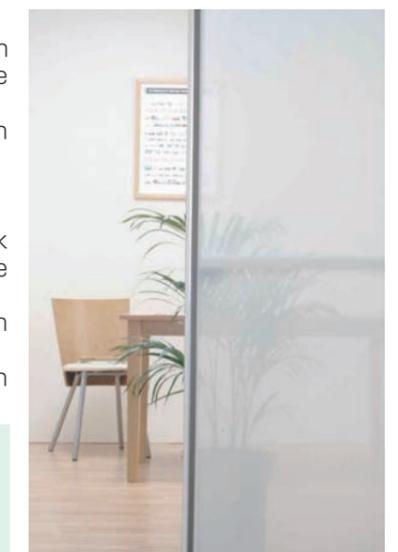
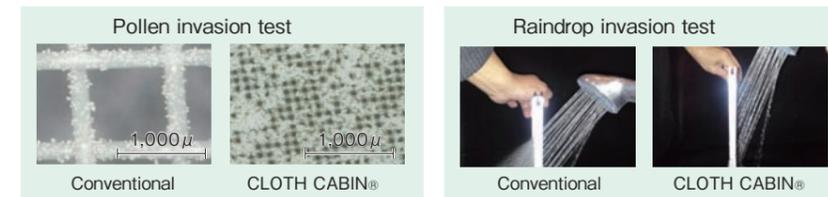
The raindrop becomes hard to invade it, too.

In a little rainfall you can open the windows.

Air flow rate is about 50 to 30% of conventional products (wind block effect) and you can secure the moderate ventilation on the day when the wind is strong.

It can cut 60% of ultraviolet rays because of ultraviolet rays absorption processing.

It is effective in shutting out the view from outside like a lace curtain and can keep your privacy.



CLOTH CABIN®