In the *Eco-products Directory 2010*, “eco-materials” refer to “materials (or material technologies) that possess excellent characteristics with good performance, which can be manufactured, used, and recycled or disposed of, while having only a low impact on the environment as well as being kind to humans.” Environment-friendly eco-materials come in a diverse range and include recyclable materials, materials free from hazardous substances, materials manufactured with low energy consumption and in clean conditions, materials that purify contaminated water and air, materials that are very efficient and resource-saving while still offering high performance, and much more.

Carefully assessing the impact on the environment within its life cycle from resource collection to the disposal stage is important in choosing eco-materials. Once this has been clarified, eco-materials can be used to create eco-products with a good balance between function and eco-efficiency. Based on this concept, eco-materials must meet the following six criteria:

1. They do not use scarce resources.
2. They have functions to clean and conserve the environment.
3. They create only low environmental impact when manufactured.
4. They do not contain any hazardous substances.
5. They provide high performance when used.
6. They are easy to recycle.
Eco-materials // Metals

EM-1-001 Metals

VCEM brand, ground granulated blast furnace slag (GGBS)

Environmental performance
GGBS’s raw material is a by-product of the iron-making industry derived from iron blast furnaces. The manufacture of GGBS reduces landfill problems and cuts gas emissions at steel plants. Every ton of GGBS reduces almost 1 ton of CO₂ by replacing Ordinary Portland Cement (OPC), a material normally used in concrete. Every ton of GGBS produced consumes only 10% of the energy required to produce 1 ton of OPC.

Product performance
Using GGBS in concrete improves workability, high compressive and flexural strengths, and resistance to damaging/aggressive chemicals. GGBS lowers permeability in concrete, therefore reducing the potential for reinforcing steel to corrode when exposed to chlorides. GGBS reduces the risk of thermal cracking in large concrete pours. GGBS's off-white color reduces the “urban heat island” effect by making lighter-color concrete, enabling it to reflect more light and cooling structures and pavements with exposed concrete.

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URL www.engro-global.com

EM-1-002 Metals

Smart Beam™ lightweight welded H-beam

Environmental performance
Sumitomo Metals is developing technologies that will allow the Smart Beam™ H-beam, which is produced continuously by welding of a hot-rolled coil, to be used for a range of applications. It is 20-30% lighter than a conventional rolled H-beam with the same performance, and is being used in industrialized home-building and other construction.

Product performance
Reducing the weight of construction materials is an important issue not only for cutting costs, but also for helping conserve natural resources. It can also be used as beams in wooden houses in order to reduce warpage of the floor and improve durability.

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Available in: Worldwide
EM-1-003  Metals

X-80 large-diameter welded steel pipe for gas pipelines

Environmental performance
This product is used for super-high pressure transportation natural gas pipe lines to boost transportation efficiency.

Product performance
In addition to increasing the level of purity in order to improve corrosion resistance, we have used our original component design and heat treatment technologies to create the X80 large-diameter welded steel pipe which further improves the strength of pipelines. As a safe pipe that can prevent rupture in case of earthquakes, this product is helping to increase the use of natural gas.

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Available in: Worldwide

EM-1-004  Metals

High Tensile Steel

Environmental performance
Demand for high tensile steel sheets (HITEN) is growing as a material that enables both automobile body weight reduction and collision safety. Recently, demand has increased for higher tensile strength steel sheets (Ultra HITEN). The cold rolled 1180MPa, created with our proprietary WQ (Water Quenching) continuous annealing process, was employed for integrally molded door impact beams made with conventional press forming.

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URL http://www.jfe-steel.co.jp/
Chromate-free coated steel sheet

**Environmental performance**
Chromate-free coated steel sheet is an environment-friendly product, since it contains no chrome (VI). A uniquely designed composite film consisting of a special organic resin and inorganic substance secures as much corrosion resistance as conventional products. It is now used in internal panels of home electric appliances and vending machines, internal components of OA equipment, chassis of audiovisual equipment, and other parts.

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all-purpose stainless steel  JFE443CT

**Environmental performance**
JFE443CT is all-purpose stainless steel which does not contain such rare resources as nickel or molybdenum but ensures high corrosion resistance equivalent to SUS304. When applied to cooking pans for induction heating (IH), it leads to substantial energy saving because of its properties of excellent heat transmission and magnetism.

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**EM-1-007**

**Highly Lubricant GA Steel Sheet: “JAZ” (JFE Advanced Zinc) "**

**Environmental performance**

As an environment-friendly product, “JAZ™” does not contain phosphate or heavy metal elements which used to be contained in conventional lubricated GA steel sheets. In this unique product, a surface reforming layer with nano-level thickness is formed on a zinc coated layer. JAZ™ has been adopted in automotive outer panels or inner panels which are otherwise difficult to form. More specifically, it is used in side panels, fenders, doors, and wheelhouses, etc.

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**EM-1-008**

**FCA-W steel plate, high-tensile-strength plate for improving the fatigue of welded joints**

**Environmental performance**

FCA-W steel plate achieved weight reductions through the development of the innovative high-tensile-strength, contributes to reducing CO₂ emission.

**Product performance**

By using this product, which not only controls the propagation of fatigue cracks, but also prevents fatigue cracks from occurring at welded joints in the first place, designers get free from design steps such as increasing plate thickness or adding reinforcement materials were used to prevent fatigue fracture of welded joints in steel structures.

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Available in: Worldwide
### EM-1-009

**Eco-materials // Metals**

**NAR-301L HS1 stainless steel plate for cylinder head gaskets**

#### Environmental performance

Sumitomo Metals (Naoetsu) has applied its original component design and manufacturing conditions to develop an ultra-fine structure steel plate with more than 30% better fatigue-resistance characteristics, contributing to technology aimed at reducing fuel consumption.

#### Product performance

The cylinder head gasket is a component that supports technology used to improve the combustion efficiency of an automobile engine and to improve fuel economy. It is important that this component have spring performance that can keep gaps closed while adapting to vibration and heat, as well as good fatigue-resistance characteristics. This product has been very highly evaluated, and is used in vehicles marketed by Honda Motor Co.

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Available in: Worldwide

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### EM-1-010

**Eco-materials // Metals**

**Non-oriented electromagnetic steel sheet for high-efficiency motors**

#### Environmental performance

This product is non-oriented electromagnetic steel sheet used in hybrid vehicle drive motors and air conditioner compressors, an iron core with superior magnetic characteristics is needed to achieve lighter weight, smaller size, and higher performance in the high-efficiency motors.

#### Product performance

We have applied its original component design and heat treatment technologies to control the crystal orientation and develop a non-oriented electromagnetic steel sheet with lower electrical loss and improved electromagnetic characteristics. This product has been praised as a revolutionary new technology from many directions.

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Available in: Worldwide
EM-1-011

NAR-AH-4 high heat-resistance stainless steel

**Environmental performance**

NAR-AH-4 contributes to the conservation of resources by using less than half of the amount of the valuable resource nickel than conventional products. At the same time, this product retains the same or better high-temperature strength and high-temperature oxidation resistance.

**Product performance**

This product is used in automobile exhaust manifolds and other applications.

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Available in: Worldwide

EM-1-012

Chrome-free thin steel sheet

**Environmental performance**

Previously chrome compounds were used for the surface treatment of steel sheet to prevent corrosion. Sumitomo Metals is developing surface-treated steel sheet that uses no chrome compounds at all, designed for specific applications.

**Product performance**

Our products for use as motor covers are known for their excellent corrosion resistance, high resistance to surface peeling under harsh forming conditions, and the fact that they do not require cleaning with organic solvents-substances that have a large impact on the environment. For fuel tank applications, we are developing a material that can be used with highly corrosive bio-ethanol fuels.

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Available in: Worldwide
EM-1-013 Metals

The New S-TEN1, high corrosion resistance steel material

**Environmental performance**
Anti-corrosive properties to combat hydrochloric acid than conventional products.

**Product performance**
Demand for steel material with outstanding anti-corrosive properties is growing rapidly, especially from waste incinerating facilities exposed to corrosive hydrochloric acid from food and plastic waste. Nippon Steel developed the new S-TEN1, with dramatically increased anti-corrosive properties to combat hydrochloric acid than conventional products. It has been on the market on a fully-fledged basis since 2003. The new S-TEN1's ability to resist hydrochloric acid is around three times higher than that of conventional products. This makes the new S-TEN1 an ideal material for use in waste processing and chemical plants. It also leads to extended product life and a reduced frequency in maintenance requirements to benefit users, as well as an overall reduction in environmental loads on a societal level.

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EM-1-014 Metals

HTUFF (Super High HAZ (heat-affected zone) Toughness)

**Environmental performance**
Welding efficiency should be ten times compared with the conventional way.

**Product performance**
The steel plates for ships, buildings and other large structures are prone to coarsening when exposed to the heat required during the welding process. Previously, a construction technique of performing welding on a gradual basis was used to ensure safety and reliability, rather than completing the welding process in one step. Nippon Steel’s HTUFF super-tough and super-strong steel sheet eliminated the needed for repeated welding, since Nippon Steel radically reduced the size of metal particles in the welding-induced heat-affected areas of the HTUFF steel sheet through nanotechnology. Such miniaturization suppresses the deterioration of HTUFF’s toughness, even when exposed to extreme temperatures. The HTUFF steel sheet drastically improved the welding efficiency of users and contributed toward energy savings.

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EM-1-015 Metals

**GA-TRIP hot-dip galvanized sheet boasts high tensile strength**

**Environmental performance**
Improving the collision safety of cars, vehicle weight and the balance between press formability and extended lifespan.

**Product performance**
Nippon Steel was the first company worldwide to successfully develop and commercialize alloy hot-dipped galvanized steel sheets for automobiles with tensile strength in the 60 and 80 kilogram classes, by overcoming the conventional notion that high tensile would be impossible without compromising the quality of galvanization. The new product was selected as a material for new car models introduced in 2003. It greatly improves the collision safety of cars, vehicle weight and the balance between press formability and extended lifespan.

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EM-1-016 Metals

**High-endothermic steel sheet**

**Environmental performance**
High-endothermic steel sheets that release the heat generated inside electric appliances efficiently to the outside.

**Product performance**
In view of the trend toward higher performance, higher speed, and smaller size, it has become important for electric appliances to release internally generated heat efficiently to the outside. Nippon Steel, after the successful development of special organic film in 2002, has started to distribute high-endothermic steel sheets that release the heat generated inside electric appliances efficiently to the outside.

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EM-1-017

**Flat rolled magnetic steel sheet/strip for high electrical efficiency**

**Environmental performance**
High-tensile thin electrical steel sheets for ultra high-speed motors etc that can increase 1% of motor efficiency.

**Product performance**
Since motors are increasingly required to be highly efficient in terms of energy saving, thin high-efficiency electrical steel sheets have applications in a variety of fields, such as motors used for hard disk drive units, motors for electric vehicles, and power generators for microgas turbines. Nippon Steel developed high-tensile thin electrical steel sheets for ultra high-speed motors and high-torque, high-formability thin electrical steel sheets for hard disc drive units.

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EM-1-018

**Lead-free steel sheet for car fuel tank**

**Environmental performance**
Lead-free aluminum or tin-zinc coated steel sheet

**Product performance**
Conventionally, lead-coated steel sheets have been used for car fuel tanks. Nippon Steel is now supplying a newly developed lead-free aluminum or tin-zinc coated steel sheet (Silver Zinc-NT). This eliminates the problem of lead in shredder dust generated when cars are scrapped.

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EM-1-019

**Steel sheet coated with chromate-free film**

**Environmental performance**
An eco-friendly resin coating, free of chromic acid, that protects the surface zinc against oxidation.

**Product performance**
Conventionally, galvanized steel sheets are used in the manufacture of home electrical appliances such as refrigerators, washing machines, and air conditioners to prevent rust. However, the sheets are coated with a film containing trace amounts of chromic acid to prevent the zinc from being oxidized. Nippon Steel developed an eco-friendly resin coating, free of chromic acid, that protects the surface zinc against oxidation.

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EM-1-020

**ZINKOTE-BLACK**

**Environmental performance**
Newly-developed water-soluble coating material that permits low-temperature drying, the film thickness of ZINKOTE-BLACK’s coating can be reduced by 70 to 80%, compared to that of conventional coated steel sheets. Also a reduction in CO₂ emissions during manufacturing at Nippon Steel, fewer organic components occurring during drying of the coating material, compared to similar coated sheets, make it possible to reduce CO₂ emissions to 1/100.

**Product performance**
ZINKOTE-BLACK is a new environmentally friendly product, using Nippon Steel’s chromate-free electrogalvanized steel sheet, ZINKOTE21.

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EM-1-021

**Advanced Plastic Mold Steel For General Purposes, "HPM-MAGIC\textsuperscript{TM}"**

**Environmental performance**

Because "HPM-MAGIC\textsuperscript{TM}" has high toughness, breakage and chipping would be reduced, and we would expect longer die life. Furthermore, because of good machinability, we can expect longer tool life and shorter working time in mold processing. Therefore "HPM-MAGIC\textsuperscript{TM}" can provide opportunities to save resource and energy.

**Hitachi Metals, Ltd.**

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URL http://www.hitachi-metals.co.jp/e/prod/prod19/p19_10.html  
URL http://www.hitachi-metals.co.jp/e/corp/corp14_01.html

Available in: Worldwide

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EM-1-022

**High Performance Cold Working Tool Steel "SLD-MAGIC\textsuperscript{TM}"**

**Environmental performance**

SLD-MAGIC\textsuperscript{TM}, newly developed Cold Working Die Steel, is showing good reputation for wear resistance and machinability along with achieving excellent characteristics of lower heat treatment distortion, versatilities for surface treatments, toughness and weldability. "SLD-MAGIC\textsuperscript{TM}" can also improve the lifespan and fabricability of die molds compared to currently used die materials. Therefore, "SLD-MAGIC\textsuperscript{TM}" can provide opportunities to reduce energy material to be used and fabrication time for making various molds for automobile industries, and other industrial fields where molds are necessary.

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URL http://www.hitachi-metals.co.jp/e/prod/prod19/p19_01.html  
URL http://www.hitachi-metals.co.jp/e/corp/corp14_01.html

Available in: Worldwide
EM-1-023

**Smigreen CS™ low carbon lead-free free-cutting steel**

**Environmental performance**

Previously, lead was used to improve the cutting performance of free-cutting steel. Smigreen CS™, low carbon steel that utilizes no lead at all thanks to an increase in the amount of sulfur compounds added, maintains good cutting machinability without including lead.

**Product performance**

This product has been adopted for use as printer shafts by a major office automation (OA) equipment manufacturer.

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Available in: Worldwide

EM-1-024

**Various steel products manufactured by using electric arc furnace**

**Environmental performance**

Comparing two methods, there is a big difference in the CO₂ emissions, namely making one ton of steel through a blast furnace method emits 2 tons of CO₂ but only 0.5 tons by an electric arc furnace method. That means, if we produce the same kind of steel, the CO₂ emissions from an electric arc furnace mill are one fourth of a blast furnace mill. Our efforts to further promote recycling of steel scraps will result in more reduction of CO₂ and consequently contribute to prevent global warming.

**Product performance**

Tokyo Steel offers high-quality, low-cost products having been realized through its aggressive investments into state-of-the-art technologies and its consistent efforts to improve quality control. In addition to the various long steel products, Tokyo Steel now also offers a full complement of flat steel products in order to meet the wider and more diversified needs of its customers in both Japan and overseas.

**Tokyo Steel Manufacturing Co., LTD.**

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URL http://www.tokyosteel.co.jp/products.html
URL http://www.tokyosteel.co.jp/pdf/sp.pdf

Hot rolled coils
Lead-free free-cutting steel (steel bars)

**Environmental performance**
Free-cutting steel products without the environmentally negative material “lead”.

**Product performance**
The shapes of crankshafts used in automobiles, among others, are very complicated. Manufacturers demand superior free-cutting capabilities in steel to guarantee ease of manufacturability in machine processing. They have other rigid requirements, including its effect on the life of tools, and demand that the materials they purchase address all aspects of manufacturing comprehensively. In order to meet their needs, Nippon Steel came up with free-cutting steel products free of environmentally negative lead. A range of products to meet the needs of automakers has been developed and offered by Nippon Steel.

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Automotive Steel Tubes

**Environmental performance**
High performance electric resistance welded steel tubes known as “HISTORY (high speed tube welding and optimum reducing technology) steel tubes” contribute to automotive weight reduction by realizing hollow tubes and properties of high strength and high formability.

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Eco-materials // Metals

**EM-1-027 Metals**

**SM125S super high-strength corrosion-resistant steel OCTG** (oil country tubular goods)

**Environmental performance**
SM125S are steel tubes with high strength and high corrosion resistance to extract natural gas, much of it exists in environments at great depths where highly corrosive hydrogen sulfide is present.

**Product performance**
SM125S create high strength (125 ksi) and high corrosion-resistant by applying a technology that envelops impurities in the steel with another impurity. This has made possible the previously impossible development of gas wells at depths of 4,000-6,000 meters or more.

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Available in: Worldwide

**EM-1-028 Metals**

**Stainless steel boiler tubes for ultra supercritical coal-fired thermal power generation**

**Environmental performance**
At coal-fired power plants, improving power-generating efficiency by increasing the temperature and pressure (to the ultra supercritical state) of the steam generated by the boiler is a key issue for saving energy and reducing CO₂ emissions. By applying stainless steel boiler tubes for ultra supercritical coal-fired thermal power generation, the efficiency improved by 2% (up to 43%), CO₂ emissions decreased by 5% compared with conventional condition (supercritical state).

**Product performance**
This product has the excellent high-temperature strength, and high resistance to steam oxidation corrosion and high-temperature corrosion, that are needed for use in ultra supercritical applications. We developed the world’s strongest 18% chrome steel for use as steel tubes, by working with 18% chrome steel and applying technology for creating smaller crystal grain using niobium (Nb) carbide, and by also applying copper supplementation. For use with high sulfur-content coal, we have also developed the world’s first 25% chrome steel for use as boiler tubes.

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Available in: Worldwide
**Steam generator heat transfer (SG) tubes for new-model furnaces at nuclear power plants**

**Environmental performance**
The SG tubes used in nuclear power plants contribute to reductions in CO₂ emissions. We are investing in increased production capacity for the SG tubes, helping to increase the global supply of electricity and reduce CO₂ emissions.

**Product performance**
The SG tubes used in nuclear power plants must be of high quality and are difficult to manufacture. The Sumitomo Metals SG tubes utilize an original manufacturing process known as "high-pressure drawing," which is characterized by its extremely small level of dimensional variation. This makes it possible to perform high-sensitivity detection of microscopic defects, allowing early detection of deterioration during use and yielding a high level of reliability. These SG tubes were first used in the AP1000, a new-model reactor designed by the U.S. company Westinghouse for improved safety and economic efficiency.

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Available in: Worldwide

**Construction method using thin-sheet steel**

**Environmental performance**
Using galvanized thin-sheet steel for the frame of two-by-four system buildings can reduce the electric power for air conditioning. Approximately 4 tons of CO₂ can be saved.

**Product performance**
Nippon Steel Corporation developed a new construction method called "Nittetsu super frame" using thin-sheet steel for low rise residential buildings. Offering extra durability, it involves the use of galvanized thin-sheet steel for the frame of wooden buildings constructed using the two-by-four system. The method involves adiabatic construction which involves packing the outside walls of the building with heat insulator. This provides more efficient heating and air-conditioning and saves energy. In addition, the use of recyclable steel products helps to conserve forest resources.

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### ECO BRASS (High-Performance Lead-free Copper Alloy)

**Environmental performance**
ECO BRASS is a lead-free brass and environmentally friendly brass material. Instead of using heavy metal harmful to the human body, a precipitating metallic compound in the metal structure realizes good machinability.

**Key Features:**
1. Lead-free
2. High strength equivalent to stainless steel
3. Good machinability nearly equal to brass rod containing 1% lead
4. Excellent machined surface, dezincification corrosion resistance, stress corrosion cracking resistance, warm brittleness cracking resistance, and hot forgeability
5. Easily accepts soldering and brazing
6. Good castability

**Applications:**
1. Water supply devices such as faucets, valves, fittings, etc.
2. Precision parts as a substitute for stainless steel such as shafts, screws, bearings
3. Electrical parts and connectors
4. Automobile parts: lead-free requirements
5. Medical devices

**Mitsubishi Shindoh Co., LTD**
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URL http://www.ecobrass.com/

**Applications:**
1. Water supply devices such as faucets, valves, fittings, etc.
2. Precision parts as a substitute for stainless steel such as shafts, screws, bearings
3. Electrical parts and connectors
4. Automobile parts: lead-free requirements
5. Medical devices

Available in: Except Europe, North America

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### Pure titanium sheet for aircraft

**Titanium alloy rods for aircraft engines**

**Environmental performance**
Titanium is being increasingly used in larger aircraft as a means of reducing weight in order to lower CO₂ emissions and reduce noise.

**Product performance**
Sumitomo Metals (Naoetsu) has been highly praised for its advanced quality management and delivery management, and is the exclusive supplier to Airbus of the pure titanium sheet used in the pylons that connect the wings and engines in the piping. In addition, the titanium alloy rods produced by Sumitomo Metals were the first such Japanese products to be certified by Rolls Royce, and will be used in aircraft engine wing components and other parts. The titanium products of the Sumitomo Metals Group have been certified by Nadcap, the global aerospace standard inspection and certification program, and are approved for use by the airline industry around the world.

**Sumitomo Metal Industries, Ltd.**
1-8-11 Harumi, Chuo-ku, Tokyo, 104-6111, Japan
Tel +81-3-4416-6183 Fax +81-3-4416-6793
E-mail chikyu-kan@sumitomometals.co.jp
URL http://www.sumitomometals.co.jp

**Applications:**
1. Water supply devices such as faucets, valves, fittings, etc.
2. Precision parts as a substitute for stainless steel such as shafts, screws, bearings
3. Electrical parts and connectors
4. Automobile parts: lead-free requirements
5. Medical devices

Available in: Worldwide
EM-1-033 Metals

Coated aluminum metal

Chromium-free new surface treatment technique

Environmental performance
Chromium-free new surface treatment technique ("Super-Ecoat™") is an environment-friendly surface treatment for aluminum, since it contains no chromium and other poisonous substance.

Product performance
In this newly developed surface treatment product, non-porous, dense and thin aluminum oxide film with active surface layer is formed on aluminum. Corrosion resistance, adhesion and bonding strength more than equal to that of conventional chromate treatment are obtained. It is now widely used in home electric appliances, electronic parts, beverage and food containers, etc.

Mitsubishi Aluminum Co., Ltd.
2-3-3, Shibata, Minato-ku, Tokyo, 105-8546, Japan
Tel +81-3-3769-0111 Fax +81-3-3769-0180
URL http://www.malco.co.jp/english/index.html
**Eco-materials // Polymers**

**EM-2-001 Polymers**

**GCS-PLA GC8400 (Pellet)**

**Environmental performance**
1. These biodegradable products contribute to reduced environmental problems caused by conventional plastic wastes.
2. These biodegradable products are stable in the atmosphere but they are decomposed by living microorganisms in compost, wet soil, and the sea.
3. These biodegradable products can be recycled several times in most conventional plastic processing equipment.

**Product performance**
GCS-PLA (GC8400) is used for biodegradable compost bags, shopping bags, etc. The base materials are AP (PLA) + starch.

**Green Chemical Co., Ltd**

17-3, Yangpyeong-Ri, Moga-Myeon, Icheon-Si, Kyunggi-Do, 467-873, Republic of Korea
Tel +82-31-632-9152 Fax +82-31-632-9153
E-mail gcspla@yahoo.co.kr
URL www.gcspla.co.kr

Available in: Worldwide

**EM-2-002 Polymers**

**GCS-PLA GC8000 (Pellet)**

**Environmental performance**
1. These biodegradable products contribute to reduced environmental problems caused by conventional plastic wastes.
2. These biodegradable products are stable in the atmosphere but they are decomposed by living microorganisms in compost, wet soil, and the sea.
3. These biodegradable products can be recycled several times in most conventional plastic processing equipment.

**Product performance**
GCS-PLA GC8000 is used for biodegradable garbage bags, compost bags, shopping bags, etc.

**Green Chemical Co., Ltd**

17-3, Yangpyeong-Ri, Moga-Myeon, Icheon-City, Kyunggi-Do, 467-873, Republic of Korea
Tel +82-31-632-9152 Fax +82-31-632-9153
E-mail gcspla@yahoo.co.kr
URL www.gcspla.co.kr

Available in: Worldwide
**EM-2-003**

**GCS-PLA GC8000T (RESIN)**

**Environmental performance**
1. These biodegradable products contribute to reduced environmental problems caused by conventional plastic wastes.
2. These biodegradable products are stable in the atmosphere but they are decomposed by living microorganisms in compost, wet soil, and the sea.
3. These biodegradable products can be recycled several times in most conventional plastic processing equipment.

**Product performance**
This biodegradable resin (GC8000T) is used for injection and extrusion of molded products such as spoons, forks, knives, chopping boards, and straws.

**Green Chemical Co., Ltd**
17-3, Yangpyeong-Ri, Moga-Myeon, Icheon-City, Kyunggi-Do, 467-873, Republic of Korea
Tel +82-31-632-9152 Fax +82-31-632-9153
E-mail gcspla@yahoo.co.kr
URL www.gcspla.co.kr

Available in: Worldwide

**EM-2-004**

**GCS-PLA GC8000R (Pellet)**

**Environmental performance**
1. These biodegradable products contribute to reduced environmental problems caused by conventional plastic wastes.
2. These biodegradable products are stable in the atmosphere but they are decomposed by living microorganisms in compost, wet soil, and the sea.
3. These biodegradable products can be recycled several times in most conventional plastic processing equipment.

**Product performance**
GCS-PLA (GC8000R) is used for biodegradable garbage bags, compost bags, and shopping bags.

**Green Chemical Co., Ltd**
17-3, Yangpyeong-Ri, Moga-Myeon, Icheon-Si, Kyunggi-Do, 467-873, Republic of Korea
Tel +82-31-632-9152 Fax +82-31-632-9153
E-mail gcspla@yahoo.co.kr
URL www.gcspla.co.kr

Available in: Worldwide
# R3plas Eco-label Recycled Plastics Resins

## Environmental performance
R3plas Recycled Resin from closed-loop system. From collecting post industrial plastics waste to consumer plastics waste to reprocess with our technology from Disassembly, Sorting, Crushing, Pellet extrusion, color compounding, pigments, additives and testing, etc tooling, manufacturing to export of finished products.

## Product performance
Good performance as prime virgin resin
Innovative products and environment friendly
Awards design for green products
Green label awards
Meet ISO 14000 and green purchasing policy

## WINRIGO (S) PTE LTD
No.21 Toh Guan Road East #04-09 Toh Guan Centre Singapore, 608609, Singapore
Tel +65-98715058 Fax +65-65154557
E-mail salewin@singnet.com.sg
URL www.winrigo.com.sg
URL www.winrigo.com.sg
URL www.winrigo.com.sg

Available in: Worldwide

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## EM-2-006 Polymers

### R3plas Eco-label Recycled Plastic resin

#### Environmental performance
Collection from post industrial waste like runner, end of life products, post industrial packaging and post consumer packaging etc

#### Product performance
R3plas Recycled PC
R3plas Recycled PS
R3plas Recycled PP
R3plas Recycled PE
R3plas Recycled ABS
R3plas Recycled LCP
R3plas Recycled PA
R3plas Recycled PPS

## WINRIGO (S) PTE LTD
No.21 Toh Guan Road East #04-09 Toh Guan Centre Singapore, 608609, Singapore
Tel +65-98715058 Fax +65-65154557
E-mail salewin@singnet.com.sg
URL www.winrigo.com.sg
URL www.winrigo.com.sg
URL www.winrigo.com.sg

R3plas Eco-label recycled plastics resins for Flower planter box

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### 12.466kg CO₂

### Inspection

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R3plas Eco-label recycled plastic resin after color compounding
**EM-2-007 Polymers**

**R3plas Bio-mass pellet** *(rice husk, wheat husk, coconut husk)*

**Environmental performance**
Rice husk, Wheat husk and Coconut husk is world most easily available and renewable source and ideal for alternative wood. It is natural and carbon natural and thereby helps mitigation of the global warming. It help prevent deforestation in Asia and help to save wildlife as well.

**Product performance**
- Better water resistant than wood
- Termite and fungus proof
- Compostable
- Recyclability
- Sustainable manufacturing
- Easy coloring
- Eco-friendly
- Cost competitive
- Eco-function in design

**WINRIGO (S) PTE LTD**
No 21 Toh Guan Road East #04-09 Toh Guan Centre, 608609, Singapore
Tel +65-63101396 Fax +65-65154557
E-mail salewin@singnet.com.sg
URL www.winrigo.com.sg
URL www.winrigo.com.sg

Available in: Worldwide

**EM-2-008 Polymers**

**ECOLA**

**Environmental performance**
Kao has integrated the quality of ECOLA, its polylactic acid resin product, to save cycle time within the production process which contributes to the reduction of environmental burden.
1. Has realized injection molding that saves time to nearly the same extent as molding widely-used resin.
   Convention molding condition : 110°C X 10min.
   New molding condition (with ECOLA) : 80°C X 30sec at most.
2. Has realized extrusion molding of transparent and soft materials such as sheet-shaped products.

**Product performance**
Kao contributes to a more easier use of eco-friendly biomass-based polymer.
In addition to the plasticity control technology that has improved the softness of molded products, our unique nano-crystal control technology has realized the products' transparency. These technologies have made it possible to expand the wide use of polylactic acid resin to plastic products.
Extrusion-molding-targeted ECOLA enables molding of sheet-shaped or film-shaped products such as transparent folders, which resemble products made of PP.
On the other hand, injection-molding-targeted ECOLA saves the molding time to nearly the same extent as molding such commonly-used resins as ABS or PP without losing the impact resistance or heat resistance after molding.

**Kao Corporation**
1-14-10, Nihonbashi Kayabacho, Chuo-ku, Tokyo, Japan
URL http://chemical.kao.com/index.html

Available in: Japan, China

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Global warming Resource Degradable
Environmental performance Design Production Transport Use/repair
Material Resource End-of-life
LC Stage
Inspection Resource/Products/Production/Transfer/Use/End-of-Life

11.53kg-CO₂
Inspection
**EM-2-009**

**Eco-materials // Polymers**

### Non-Toxic One Pack PVC Stabilisers

**Environmental performance**

Non-toxic one pack PVC stabilisers are free from heavy metal ingredients and offer efficient stabilisation and processability during the manufacturing of PVC products.

**Product performance**

Sun Ace’s Non-toxic one pack PVC stabiliser comply with RoHS requirements for electrical application and European Food Safety Authority (EFSA) for food-in-contact applications like drinking water pipes.

**Sun Ace Kakoh (Pte.) Ltd**

34 Tanjong Penjuru, Jurong Town, 609030, Singapore
Tel +65-62640255 Fax +65-62657038
E-mail sales@sunace.com.sg
URL www.sunace.com.sg
URL www.sunace.com.sg
URL www.sunace.com.sg

Available in: Worldwide

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**EM-2-010**

**Eco-materials // Polymers**

### SUMIKON EME

**Environmental performance**

Sumitomo Bakelite has developed an epoxy resin molding material for semiconductor sealing that is free of bromine- and antimony-based flame retardants, which have a negative impact on the environment, is free of substances for which there is concern about their environmental impact, and conforms with global environmental standards as a molding material that can be used in lead-free solder mounting. The company has developed and marketed the new SUMIKON EME G700 series for applications that require high reliability and the new SUMIKON EME G600 series for ordinary semiconductor package applications, all of which use an epoxy resin with superior fire retardant capabilities. We have also launched the SUMIKON EME E series for discrete applications.

**Sumitomo Bakelite Co., Ltd.**

2-5-8, Higashishinagawa, Shinagawa-ku, Tokyo, 140-0002, Japan
Environmental performance

To respond to narrowing circuit widths required due to the sharp increase in semiconductor memory capacity as well as higher speeds and to satisfy strict demands for reliability, Sumitomo Bakelite has developed and marketed the SUMIRESIN EXCEL CRC 8000 series of positive photosensitive wafer coating resins. This enables semiconductor manufacturers to use alkaline water as a developing fluid and pure water as a rinsing solution, rendering special solvents unnecessary. In addition, with certain wafer level packages, it can be used in place of conventional plastic-based sealants for rewiring, reducing the length of processing and thus conserving resources and energy.

Sumitomo Bakelite Co., Ltd.

Tennosu Parkside Bldg., 2-5-8, Higashishinagawa, Shinagawa-ku, Tokyo, 140-0002, Japan

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Environmental performance

In order to save weight of automotive mechanical parts with metal replacement, SUMITOMO BAKELITE CO., LTD. develops and commercializes excellent phenolic molding compounds which has high strength, high rigidity, good dimensional stability and high reliability by unique formulation of various additives and fillers with phenolic resin which has high heat resistance and excellent chemical resistance. The SUMIKON® PM series is widely used as automotive mechanical parts, such as FEAD pulleys, disc brake pistons and water pump covers.

Sumitomo Bakelite Co., Ltd.

2-5-8, Higashishinagawa, Shinagawa-ku, Tokyo, 140-0002, Japan
Eco-friendly material using solution-dyeing fibers made of recycled plastic bottles: Shagarl

Environmental performance
* Eco Mark certificate number 05104041 (95% Recycled PET Fiber)
* 100% recycled plastic bottle material
* No formaldehyde
* Excellent in energy conservation (Air-conditioning electricity bills are reduced by 70% with external sun-shading)

Product performance
* Fireproof (authorized by the Japan Fire Retardant Association [JFRA] as Flame-retardant product)
* Excellent weather resistance (solution-dyeing fibers are used)
* Waterproof property (resistance to 1000 mm of water pressure)

N.I. TEIJIN SHOJI CO., LTD.
Teijin Bldg., 6-7, Minami-hommachi 1-chome, Chuo-ku, Osaka, Japan
Tel +81-6-6266-8116 Fax +81-6-6244-1980
E-mail knoda24113@ni-teijinshoji.co.jp
URL http://www2.ni-teijinshoji.co.jp/
URL http://tent.teijin.co.jp
URL http://www.teijin.co.jp

Available in: Japan
**Eco-materials // Natural materials**

### EM-3-001

#### Natural materials

**heat-resistant polylactic acid**

#### BIOFRONT®, heat resistant polylactic acid

**Environmental performance**

BIOFRONT® offers significantly higher heat-resistance and crystallization rate than conventional bioplastics.

**Product performance**

BIOFRONT® is a stereocomplex PLA that has a melting point of 210°C, or 40°C higher than conventional PLA. Teijin has successfully upgraded BIOFRONT® with substantially improved hydrolytic resistance. These meet practical requirements in industrial markets such as automotive, office equipment and electronics.

*Stereocomplex PLA

The unique crystal structure composed of L-molecule and its optical isomer D-molecule are behind the new physical properties that include high heat-resistant characteristics

**Teijin Limited**

2-1, Kasumigaseki 3-chome, Chiyoda-ku, Tokyo, 100-8585, Japan

Tel +81-3-3506-4096

E-mail biofront@teijin.co.jp

URL http://www.teijin.co.jp/english/index.html

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### EM-3-002

#### Natural materials

**synthetic fiber**

#### Crafts from Banana Fiber

**Environmental performance**

Fiber extracted from Banana sheeth is bio-degradable as well have long life. Banana fiber is extracted from the waste part of banana tree. It gives employmen to pportunity for the poor.

**Product performance**

Crafts made from Banana fiber is soft in nature. Any kind of craft materials could be made from Banana Fiber. Even sarees are incorporating Banana fiber which give cool effect to the body.

**Mother Theresa Development Research Institute**

No.4/3B, Freeman Street, Kottapattu, Golden Rock Post, Ponmalaiappatti, Trichy, 620004, Tamil Nadu, South India

Tel +91-431-2491671

E-mail mtdri2000@gmail.com

URL http://www.freewebs.com/mtdri

Available in: Worldwide
**Eco-materials // Natural materials**

**EM-3-003 Natural materials**

cotton fabrics

**BREVANO ECO: Anti-flaming, antistatic fabric of ecology-specs**

**Environmental performance**

Fabric made from blending of excellent flameproof acrylic fiber and unused cotton generated during spinning process accounting for 10% of total material.
- Designated "EcoMark certified product", Japan's environmental label.

**Product performance**

- Having excellent anti-flaming property coupled with self-extinguishing property. LOI* (limited oxygen index) 29 to 32.
- Excellent in non-fusibility, compared with 100% general synthetic fibers. Safe as it would not stick to skin.
- Having superior antistatic property (complying with JIS8118: friction static electrical charge less than 7 micro C/m²).
- Refreshing and easy-to wear, due to their excellent sweat absorption.
- Will not pill.
- Good coloring, good color fastness.

*Note: LOI is a measure to show the degree of flammability. The less flammable, the higher the figure is. Generally, anti-flammable materials show the figure of 26 or higher.

**KURABO INDUSTRIES LTD.**

4-31, 2-Chome, Kyutaro-machi, Chuo-ku, Osaka, 541-8581, Japan
Tel +81-6-6266-5295 Fax +81-6-6266-5539
E-mail uniform_sect@kurabo.co.jp
URL http://www.kurabo.co.jp/

Available in: Japan, Worldwide

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**EM-3-004 Natural materials**

cotton fabrics

**BioNature: Eco-oriented soil-returnable fabric**

**Environmental performance**

Bionature is a fabric made from natural fiber and eco-friendly polyester of DUPONT(TM).
Bionature collapses in the compost with which environment was ready.
The reduction of its weight and the loss of its molecular weight show the decomposition of Bionature in the compost.
Safety is identified from the composts obtained in the decomposition process that have no impact on the earthworm reproduction and plants growth.

**Product performance**

The physical properties are strengthened without spoiling the biodegradation of natural materials, such as cotton and wool.

**KURABO INDUSTRIES LTD.**

4-31, 2-Chome, Kyutaro-machi, Chuo-ku, Osaka, 541-8581, Japan
Tel +81-6-6266-5295 Fax +81-6-6266-5539
E-mail uniform_sect@kurabo.co.jp
URL http://www.kurabo.co.jp/

Available in: Japan, Worldwide
<table>
<thead>
<tr>
<th>Natural materials</th>
<th>Cotton fabrics</th>
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</thead>
<tbody>
<tr>
<td><strong>EM-3-005</strong></td>
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<tr>
<td><strong>Return Cotton: An eco-friendly material for a sound recycling society</strong></td>
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<tr>
<td><strong>Environmental performance</strong></td>
<td>Return Cotton is produced using our unique technology by recycling various unused fibers such as waste cotton generated in the cotton-spinning process. This is an eco-friendly material aimed at helping to achieve a sound recycling society. (Designated “Eco Mark certified product”, Japan’s environment label.)</td>
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<td><strong>Designated “Eco Mark certified product”, Japan’s environment label.</strong></td>
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<td><strong>KURABO INDUSTRIES LTD.</strong></td>
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<td>4-31, 2-Chome, Kyutaro-machi, Chuo-ku, Osaka, 541-8581, Japan</td>
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<tr>
<td><strong>EM-3-006</strong></td>
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<tr>
<td><strong>EARTHDENIM: New feel denim born from our Eco-oriented research.</strong></td>
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<tr>
<td><strong>Environmental performance</strong></td>
<td>EARTHDENIM makes effective reuse of waste from each stage of production.</td>
</tr>
<tr>
<td>- EARTHDENIM is made by recycling denim production waste.</td>
<td></td>
</tr>
<tr>
<td>- A pair of jeans made of EARTHDENIM reduces CO₂ in a quantity equivalent to the quantity absorbed by about 180 four-leafed-clovers a year.</td>
<td></td>
</tr>
<tr>
<td><strong>Product performance</strong></td>
<td>It makes possible a super dark blue color as unmatched by normal dyeing. And it contributes to reduction of CO₂.</td>
</tr>
<tr>
<td>- Super dark blue and White core</td>
<td></td>
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<tr>
<td><strong>KURABO INDUSTRIES LTD.</strong></td>
<td></td>
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<tr>
<td>4-31, 2-Chome, Kyutaro-machi, Chuo-ku, Osaka, 541-8581, Japan</td>
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<td>Tel +81-6-6266-5326 Fax +81-6-6266-5204</td>
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<td>E-mail <a href="mailto:casual_sect@kurabo.co.jp">casual_sect@kurabo.co.jp</a></td>
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## Eco-materials // Natural materials

### EM-3-007

#### ECO • WASH: Eco-friendly shrink-resistant wool

**Environmental performance**
Conventional chlorination treatment applied for shrink-proofing of wool fiber causes environmental contamination. This is because residual chlorine in industrial waste water drained into rivers reacts with organic matter and turns into a carcinogen (AOX=Absorbable Halogens), a harmful substance to humans and the environment.

In ECO-WASH’s case, ozone is used instead of chlorine, which is non-AOX and greatly reduces the burden of contamination to the environment, and further, it has much less damaging effects to wool fiber than done by the conventional chlorine treatment for shrink-proofing.

**Product performance**
ECO-WASH is the world first shrink-resistant wool by ozone treatment.
- Smooth and neat surface look, fluffy
- Natural stretchability
- Excellent shrink-resistance
- Water repellency is retained (together with moisture releasing property of wool makes ECO-WASH comfortable)

KURABO INDUSTRIES LTD.
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Tel +81-6-6266-5408 Fax +81-6-6266-5119
E-mail takaharu_nakayama@kurabo.co.jp
URL http://www.kurabo.co.jp

Available in: Japan, Worldwide

### EM-3-008

#### JAPANESE DOMESTIC WOOD MATERIAL PLYWOOD WITH CARBON FOOTPRINTING

**Environmental performance**
As for the domestic wood that the Sumitomo Forestry group has positively used in Japan, the amount of the CO₂ exhaust at the procurement stage of the raw material can be greatly little compared with the import wood for which the long-distance transportation is necessary. Sumitomo Forestry, CrestCo.LTD manufacture plywood with using raw material switch from imported wood to domestic wood, as a result reduction of 1.2kg CO₂ in one sheet of plywood. A further CO₂ exhaust amount reduction is scheduled in the Sumitomo Forestry Crest. based on the numerical value displayed this time. Moreover, the use of the carbon footprint system to which institutionalization is advanced aiming at the market introduction is scheduled to be examined in the future though this display becomes an independent display.

SUMITOMO FORESTRY CREST CO., LTD.
3-26 KANDA NISHIKI-CHOU, CHIYODA-KU, TOKYO, Japan

Available in: Japan
Labeling Particle Boards Products with Carbon Footprint Mark

**Environmental performance**

PT. Rimba Partikel Indonesia is related companies of Sumitomo Forestry manufacturing particle boards began an independent "Carbon footprint" display in Indonesia in October, 2009. As for "Carbon footprint" display to the wood product by an Indonesian enterprise, the RPI Co. becomes the first attempt. Produced PB is used, and ecologically friendly product in the RPI Co. as the raw material in effective the resource as for the surplus material, the scrap, and its own afforestation tree in the woods. As for RPI, the wood biomass power generation was introduced in 2008 and the less amount of the CO2 exhaust with using clean energy. The use of the carbon footprint system to which institutionalization is advanced aiming at the market introduction is scheduled to be examined in the future though this display becomes an independent display. 156.8kg-CO2 per m³.

**PT. Rimba Partikel Indonesia**

KENDAL, JAWA, TENGAH 51372 INDONESIA, Indonesia
Tel +62-248662990 Fax +62-248662988
URL http://sfc.jp/english/

Available in: Indonesia, Malaysia, China

**EM-3-010 Natural materials paper**

**U-PET Paper** (synthetic printing paper manufactured using recycled PET materials)

**Environmental performance**

Over 99% recycled PET materials

**Product performance**

Synthetic printing paper manufactured using recycled PET materials. Suitable for offset printing and laser printing. Matt surface with water permeability. Can be written on with pencil, oil pen, permanent marker, etc.

**Active Life co.ltd.**

5-8 Suehiro, Suwa-city, Nagano, 392-0025, Japan
Tel +81-266-52-3490 Fax +81-266-58-0167
E-mail info@active-life.co.jp
URL http://www.active-life.co.jp/
EM-3-011  
**R3plas Biocomposites resin -Rice Husk, Wheat Husk**

### Environmental performance
- R3plas Bio-composite is development from Bio-mass, Rice Husk or Wheat husk which is non food crop.
- R3plas Bio-composite resin made up of 70-90% of renewable source and Recycled Plastics waste.
- Help to prevent deforestation by provide alternative to woods demand.
- Double reduction in CO2 through LCA.

### Product performance
- Better water Resistant than wood
- Termite and Fungus proof
- Weather proof
- Reusability and recyclability
- Easy coloring
- New Design Possibility (flexible)
- Eco-friendly
- cost effective

**WINRIGO (S) PTE LTD**

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Tel +65-63101396 Fax +65-65154557
E-mail salewin@singnet.com.sg
URL www.winrigo.com.sg
URL www.winrigo.com.sg
URL www.winrigo.com.sg

Available in: Worldwide

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EM-3-012  
**R3plas Eco-Pallet from Bio-Mass -Rice husk and Wheat husk**

### Environmental performance
- Rice husk is one of world largest easily available Bio-mass and an ideal alternative to wood.
- It meet Japan Bioplastics Association & International standard of Bio masPla.
- Is it Carbon -neutral thereby helps mitigation of the global warming and they contribute to reduce the consumption of fossil resoucres.

### Product performance
- Better water resistant than wood
- Termite and fungus proof
- Weather proof
- Reusability and recyclability
- Design possible
- Eco-friendly
- Cost competitive
- Easy colouring
- Sustainable manufacturing

**WINRIGO (S) PTE LTD**

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URL www.winrigo.com.sg
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URL www.winrigo.com.sg

Available in: Worldwide
# Eco-materials // Natural materials

<table>
<thead>
<tr>
<th>EM-3-013</th>
<th>Natural materials</th>
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<tbody>
<tr>
<td><strong>handle cup corn_small</strong></td>
<td>corn fiber</td>
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</table>

## Environmental performance
- Is completely decomposed by microorganisms when buried.
- Environment with no human hormone is harmless ingredients.
- To reduce greenhouse gas emissions is a future-oriented material.
- Plastic properties of the oil is replaced.
- Material is environmentally certified.
- Therefore, prevention of global warming prevent effects, water and soil, air pollution has the ability to prevent.

## Product performance
- Cup is easy to use, the better use children.
- Pretty colors, cute shape.
- Get the handle to fill the water can be easily moved.
- Environment, free from worry of hormones.
- Is effective in preventing environmental hormones. Size is also easy to use. The kids can even use. This beautiful color, beautiful appearance. The product is environmentally friendly material.

**CS Dongyang Co., LTD.**
Neungwon-ri Mohyun-myeon Cheoin-gu Yongin-si Gyeonggi-do, Republic of Korea
Tel +82-31-322-1736

Available in: Republic of Korea

<table>
<thead>
<tr>
<th>EM-3-014</th>
<th>Natural materials</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Handle cup corn_medium</strong></td>
<td>corn fiber</td>
</tr>
</tbody>
</table>

## Environmental performance
- Is completely decomposed by microorganisms when buried.
- Environment with no human hormone is harmless ingredients.
- To reduce greenhouse gas emissions is a future-oriented material.
- Plastic properties of the oil is replaced.
- Material is environmentally certified.
- Therefore, prevention of global warming prevent effects, water and soil, air pollution has the ability to prevent.

## Product performance
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Neungwon-ri Mohyun-myeon Cheoin-gu Yongin-si Gyeonggi-do, Republic of Korea
Tel +82-31-322-1736

Available in: Republic of Korea
**Eco-materials // Natural materials**

**EM-3-015**

**Corn mini-cup**

**Environmental performance**
- Is completely decomposed by microorganisms when buried.
- Environment with no human hormone is harmless ingredients.
- To reduce greenhouse gas emissions is a future-oriented material.
- Plastic properties of the oil is replaced.
- Material is environmentally certified.

Therefore, prevention of global warming prevent effects, water and soil, air pollution has the ability to prevent.

**Product performance**
- Children’s hands is just the right size of a small cup.
- The characters are printed outside of the cup.
- The size of the circular cup is easy to catch.
- Environmental hormones are not harmless.

**CS Dongyang Co., LTD.**

Neungwon-ri Mohyun-myeon Cheoin-gu Yongin-si Gyeonggi-do, Republic of Korea
Tel +82-31-322-1736

Available in: Republic of Korea

---

**EM-3-016**

**Hart cup corn**

**Environmental performance**
- Is completely decomposed by microorganisms when buried.
- Environment with no human hormone is harmless ingredients.
- To reduce greenhouse gas emissions is a future-oriented material.
- Plastic properties of the oil is replaced.
- Material is environmentally certified.

Therefore, prevention of global warming prevent effects, water and soil, air pollution has the ability to prevent.

**Product performance**
- Cup is easy to use, the better use children.
- Pretty colors, cute shape.
- Get the handle to fill the water can be easily moved.
- Environment, free from worry of hormones.
- Is effective in preventing environmental hormones. Size is also easy to use. The kids can even use. This beautiful color, beautiful appearance. The product is environmentally friendly material.

**CS Dongyang Co., LTD.**

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Tel +82-31-322-1736

Available in: Republic of Korea
Eco-materials // Natural materials

EM-3-017 Natural materials

Corn soup bowl

Environmental performance
Is completely decomposed by microorganisms when buried. Environment with no human hormone is harmless ingredients. To reduce greenhouse gas emissions is a future-oriented material. Plastic properties of the oil is replaced. Material is environmentally certified. Therefore, prevention of global warming prevent effects, water and soil, air pollution has the ability to prevent.

Product performance
Can be used to eat the soup or stew. Corn was used as an ingredient. From environmental hormones are harmless. Can be used for different purposes. It is a bowl of corn ingredients. It is easy to eat soup or stew. Can be used for different purposes. From environmental hormones are harmless.

CS Dongyang Co., LTD.
Neungwon-ri Mohyun-myeon Cheoin-gu Yongin-si Gyeonggi-do, Republic of Korea
Tel +82-31-322-1736

Available in: Republic of Korea

EM-3-018 Natural materials

Corn bowl

Environmental performance
Is completely decomposed by microorganisms when buried. Environment with no human hormone is harmless ingredients. To reduce greenhouse gas emissions is a future-oriented material. Plastic properties of the oil is replaced. Material is environmentally certified. Therefore, prevention of global warming prevent effects, water and soil, air pollution has the ability to prevent.

Product performance
Can be used to eat the soup or stew. Corn was used as an ingredient. From environmental hormones are harmless. Can be used for different purposes. It is a bowl of corn ingredients. It is easy to eat soup or stew. Can be used for different purposes. From environmental hormones are harmless.

CS Dongyang Co., LTD.
Neungwon-ri Mohyun-myeon Cheoin-gu Yongin-si Gyeonggi-do, Republic of Korea
Tel +82-31-322-1736

Available in: Republic of Korea
Eco-materials // Natural materials

EM-3-019 Corn Square tray

Environmental performance
Is completely decomposed by microorganisms when buried. Environment with no human hormone is harmless ingredients. To reduce greenhouse gas emissions is a future-oriented material. Plastic properties of the oil is replaced. Material is environmentally certified. Therefore, prevention of global warming prevent effects, water and soil, air pollution has the ability to prevent.

Product performance
Environment, free from worry of hormones. It is Yellow color. Compartment of the tray so you can hold a variety of foods. The tray compartment, and the color is yellow. Beautiful pictures are printed. Environment, free from worry of hormones. Children can separate the food.

CS Dongyang Co., LTD.
Neungwon-ri Mohyun-myeon Cheoin-gu Yongin-si Gyeonggi-do, Republic of Korea
Tel +82-31-322-1736

Available in: Republic of Korea

EM-3-020 Corn fork spoon set 4P

Environmental performance
Is completely decomposed by microorganisms when buried. Environment with no human hormone is harmless ingredients. To reduce greenhouse gas emissions is a future-oriented material. Plastic properties of the oil is replaced. Material is environmentally certified. Therefore, prevention of global warming prevent effects, water and soil, air pollution has the ability to prevent.

Product performance
Environment, free from worry of hormones. 2 spoons and 2 forks to a set of items is achieved. Easy to use, and is particularly suitable for children's sizes. Beautiful pictures are printed on the handle. Environment, free from worry of hormones. Yellow is the color of the product, pretty pictures are printed on the handle.

CS Dongyang Co., LTD.
Neungwon-ri Mohyun-myeon Cheoin-gu Yongin-si Gyeonggi-do, Republic of Korea
Tel +82-31-322-1736

Available in: Republic of Korea
### Eco-materials // Natural materials

#### EM-3-021 Natural materials

<table>
<thead>
<tr>
<th>Corn Spoon Chopsticks case</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environmental performance</strong></td>
</tr>
<tr>
<td>Is completely decomposed by microorganisms when buried. Environment with no human hormone is harmless ingredients. Plastic properties of the oil is replaced. Material is environmentally certified. Therefore, prevention of global warming prevent effects, water and soil, air pollution has the ability to prevent.</td>
</tr>
<tr>
<td><strong>Product performance</strong></td>
</tr>
<tr>
<td>When you go to a picnic or a trip to carry a spoon and chopsticks are for the case. Lightweight and can be a long time I did not break. Easy to clean and have freedom from worry about environmental hormones. Yellow is the color of the product, the lid is a lovely character picture is printed. You can easily open and close the lid.</td>
</tr>
<tr>
<td><strong>CS Dongyang Co., LTD.</strong></td>
</tr>
<tr>
<td>Neungwon-ri Mohyun-myeon Cheoin-gu Yongin-si Gyeonggi-do, Republic of Korea</td>
</tr>
<tr>
<td>Tel +82-31-322-1736</td>
</tr>
<tr>
<td>Available in: Republic of Korea</td>
</tr>
</tbody>
</table>

#### EM-3-022 Natural materials

<table>
<thead>
<tr>
<th>CornWare</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environmental performance</strong></td>
</tr>
<tr>
<td>CornWare is a range of eco-friendly, 100% biodegradable disposable tableware made from corn. It will biodegrade after 90 days upon discharge and is also carbon neutral. CornWare has also been awarded accreditations by Green Label Singapore &amp; ISO for Biodegradability &amp; Environmental Management.</td>
</tr>
<tr>
<td><strong>Product performance</strong></td>
</tr>
<tr>
<td>CornWare is sturdy, reliant and safe for use for adults and kids alike. It doesn't snap or break easily due to its strong structure. CornWare is microwaveable, acid &amp; alkali proof, water &amp; leakage proof and able to withstand temperatures from -20°C to 150°C. It is certified safe and toxin-free by the FDA.</td>
</tr>
<tr>
<td><strong>Olive Green Marketing Pte Ltd.</strong></td>
</tr>
<tr>
<td>63 Hillview Avenue #03-08 Lam Soon Industrial Building, 669569, Singapore</td>
</tr>
<tr>
<td>Tel +65-67671301 Fax +65-67679908</td>
</tr>
<tr>
<td>E-mail <a href="mailto:marketing@olivegreen.com.sg">marketing@olivegreen.com.sg</a></td>
</tr>
<tr>
<td>URL <a href="http://www.olivegreen.com.sg">www.olivegreen.com.sg</a></td>
</tr>
<tr>
<td>Available in: Singapore</td>
</tr>
</tbody>
</table>
**CornWare**

**Environmental performance**
CornWare is a range of eco-friendly, 100% biodegradable disposable tableware made from corn. It will biodegrade after 90 days upon discharge and is also carbon neutral. CornWare has also been awarded accreditations by Green Label Singapore & ISO for Biodegradability & Environmental Management.

**Product performance**
CornWare is sturdy, reliable, and safe for use for adults and kids alike. It doesn't snap or break easily due to its strong structure. CornWare is microwaveable, acid- and alkali-proof, water- and leakage-proof, and able to withstand temperatures from -20°C to 150°C. It is certified safe and toxin-free by the FDA.

**Olive Green Marketing Pte Ltd.**

63 Hillview Avenue #03-08 Lam Soon Industrial Building, 669569, Singapore
Tel +65-67671304 Fax +65-67679908
E-mail marketing@olivegreen.com.sg
URL www.olivegreen.com.sg

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**CornWare**

**Environmental performance**
CornWare is a range of eco-friendly, 100% biodegradable disposable tableware made from corn. It will biodegrade after 90 days upon discharge and is also carbon neutral. CornWare has also been awarded accreditations by Green Label Singapore & ISO for Biodegradability & Environmental Management.

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E-mail marketing@olivegreen.com.sg
URL www.olivegreen.com.sg
Eco-materials // Natural materials

EM-3-025 Natural materials corn fiber

CornWare

Environmental performance
CornWare is a range of eco-friendly, 100% biodegradable disposable tableware made from corn. It will biodegrade after 90 days upon discharge and is also carbon neutral. CornWare has also been awarded accreditations by Green Label Singapore & ISO for Biodegradability & Environmental Management.

Product performance
CornWare is sturdy, reliable, and safe for use for adults and kids alike. It doesn't snap or break easily due to its strong structure. CornWare is microwaveable, acid- and alkali-proof, water- and leakage-proof, and able to withstand temperatures from -20°C to 150°C. It is certified safe and toxin-free by the FDA.

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E-mail marketing@olivegreen.com.sg
URL www.olivegreen.com.sg

EM-3-026 Natural materials corn fiber

CornWare

Environmental performance
CornWare is a range of eco-friendly, 100% biodegradable disposable tableware made from corn. It will biodegrade after 90 days upon discharge and is also carbon neutral. CornWare has also been awarded accreditations by Green Label Singapore & ISO for Biodegradability & Environmental Management.

Product performance
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Tel +65-67671304 Fax +65-67679908
E-mail marketing@olivegreen.com.sg
URL www.olivegreen.com.sg
### EM-3-027  
**CornWare**

**Environmental performance**
CornWare is a range of eco-friendly, 100% biodegradable disposable tableware made from corn. It will biodegrade after 90 days upon discharge and is also carbon neutral. CornWare has also been awarded accreditations by Green Label Singapore & ISO for Biodegradability & Environmental Management.

**Product performance**
CornWare is sturdy, reliable, and safe for use for adults and kids alike. It doesn’t snap or break easily due to its strong structure. CornWare is microwaveable, acid- and alkali-proof, water- and leakage-proof, and able to withstand temperatures from -20°C to 150°C. It is certified safe and toxin-free by the FDA.

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E-mail marketing@olivegreen.com.sg  
URL www.olivegreen.com.sg

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### EM-3-028  
**CornWare**

**Environmental performance**
CornWare is a range of eco-friendly, 100% biodegradable disposable tableware made from corn. It will biodegrade after 90 days upon discharge and is also carbon neutral. CornWare has also been awarded accreditations by Green Label Singapore & ISO for Biodegradability & Environmental Management.

**Product performance**
CornWare is sturdy, reliable, and safe for use for adults and kids alike. It doesn’t snap or break easily due to its strong structure. CornWare is microwaveable, acid- and alkali-proof, water- and leakage-proof, and able to withstand temperatures from -20°C to 150°C. It is certified safe and toxin-free by the FDA.

**Olive Green Marketing Pte Ltd.**
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E-mail marketing@olivegreen.com.sg  
URL www.olivegreen.com.sg
EM-3-029  Natural materials  
corn fiber

CornWare

Environmental performance
CornWare is a range of eco-friendly, 100% biodegradable disposable tableware made from corn. It will biodegrade after 90 days upon discharge and is also carbon neutral. CornWare has also been awarded accreditations by Green Label Singapore & ISO for Biodegradability & Environmental Management.

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E-mail marketing@olivegreen.com.sg
URL www.olivegreen.com.sg

Set of biodegradable cutlery

EM-3-030  Natural materials  
corn fiber

CornWare

Environmental performance
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URL www.olivegreen.com.sg

Biodegradable dessert spoon
EM-3-031 // Natural materials

**R3plas Oxo-biodegradable plastic packaging**

**Environmental performance**
- Degradation with presence of UV, thermal and oxidation.
- Environmental friendly and good transparency.
- Supports Governmental ISO 14000 standards.
- Meets ASTM standards.
- Member of Oxo-Biodegradable Plastics Institute, USA
- www.biodeg.org

**Product performance**
- R3plas Oxo-biodegradable plastics shopping bags
- R3plas Oxo-biodegradable plastics food trays
- R3plas Oxo-biodegradable anti-static bubble bags
- R3plas Oxo-biodegradable garbage bag in rolls
- R3plas Oxo-biodegradable conductive bag for semi-conductor industry
- R3plas Oxo-biodegradable clean room bags
- R3plas Oxo-biodegradable disposable cups
- R3plas Oxo-biodegradable disposable cutlery
- R3plas Oxo-biodegradable agricultural seeding bags
- R3plas Oxo-biodegradable food containers

**WINRIGO (S) PTE LTD**

No 21 Toh Guan Road East #04-09 Toh Guan Centre, 608609, Singapore
Tel +65-63101396 Fax +65-65154557
E-mail salewin@signet.com.sg
URL www.winrigo.com.sg
URL www.winrigo.com.sg
URL www.winrigo.com.sg

Available in: Asia

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EM-3-032 // Natural materials

**Environment-friendly biodegradable film**

**Environmental performance**
1. These biodegradable films are stable in the atmosphere but are decomposed by living microorganisms in compost, wet soil, and the sea.
2. As an environment mark accreditation product, it is an environment-friendly raw material that can convert into H₂O and CO₂ upon complete dissolution by a soil microorganism after use.
3. These biodegradable films can be recycled several times in most conventional plastic processing equipment.

**Product performance**
- Garbage bags, food & drink garbage bags, shopping bags, luxury shopping bags, mulching film for agriculture, film for landscape architecture work.
- Disposable gloves, disposable table cloths, roll bags

**Korea UB Clean Co, Ltd.**

459-11, Gilsong-ri, Hyangnam-myeon, Hwaseong-si, Gyeonggi-do, 445-921, Republic of Korea
Tel +82-1600-1649 Fax +82-31-3599177
E-mail ub@kubc.co.kr
URL http://www.kubc.co.kr

Available in: Japan, Oceania, Europe, North America, Middle and Near East, Republic of Korea, China
**EM-3-033**

**Natural materials**

**Eco-materials**

**Nanocarbon from woody biomass**

**Environmental performance**
- Reduction GHG and effective application of green resource
- Providing post-petroleum resources products
- Fixing carbon from atmosphere by using woody biomass as raw material.
- Improving CO₂ absorption of forests by proper thinning wood

**Product performance**
- Nanocarbon is known as a great addition agent which can improve strength, conductivity and heat transfer of base materials such as plastic, ceramic and metal. Nanocarbon is also applied to an electrode of lithium battery. Toshiba has developed the nanocarbon production system, which use woody biomass as raw materials by applying pyrolysis technology.

**TOSHIBA CORPORATION Social Infrastructure Systems Company**

1-1, Shibaura 1-Chome, Minato-Ku, Tokyo, 105-8001, Japan
Tel +81-3-3457-4204

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**EM-3-034**

**Natural materials**

**Eco-materials**

"**Kanryoso**®; stronger skin rush"

**Environmental performance**
Rush is widely known as a material of "tatami" in Japanese housing. The features of "tatami" are not only the fragrance and strength, but also humidity control. In addition, it has been lately found that rush has a function of adsorbing chemical substances and of deodorizing. (Ex. NH₃ 99.3%, CH₃COOH 95.6%). The "Kanryoso" rush has stronger skin compared with the previous rush. (ref., the photograph of electron-microscopy). This is a result of cultivation in which the intrinsic activity of rush has been fully leveraged. Every piece of the rush is thick and uniform.

**Product performance**
Because of its strength the life of products made from "Kanryoso" is long. Rush is a plant that grows by taking CO₂ into its body. Namely, the long-life "Kanryoso" product fixes CO₂ for a longer period than conventional products. We are therefore contributing to the fixation of CO₂ by raising young rushes.

**IKEHIKO CORPORATION Co.,Ltd.**

1052 Miyamatsu, Ooki-machi, Mizuma-gun, Fukuoka, 830-0424, Japan
Tel +81-944-32-1203 Fax +81-944-33-1059
URL http://www.ikehiko.com

Available in: Japan
Biomass Fuel Conversion: Palm Kernel Shells

Environmental performance

ORIX offers proposals to customers to switch from using fossil fuels such as petroleum or heavy oil to biomass fuel. Fuel conversion enables customers to slash costs, stabilize fuel prices, reduce their environmental impact and contribute to a low carbon society. Japan is currently experiencing a shortage of biomass fuel in the form of wood chips and pellets from construction waste, and supplies are unstable. ORIX purchases and supplies biomass fuel produced overseas (Indonesian palm kernel shells).

ORIX Corporation

12-15, Nihonbashi-kobunacho, Chuo-ku, Tokyo, 103-0024, Japan
Tel +81-3-6667-2271 Fax +81-3-3249-1985
URL http://www.orix.co.jp/grp/
URL http://www.orix.co.jp/grp/eco_orix.htm
URL http://www.orix.co.jp/grp/co/environment/index.htm
### Eco-materials // Foam

#### EM-4-001 Foam

**Environment-friendly biodegradable foam (regreen-foam)**

**Environmental performance**

It not only can substitute completely for existing styrofoam buffering material used for packaging but also can be used widely compared to styrofoam since it is produced by corn starch that is naturally obtained and does not generate static electricity. Furthermore it is a good choice for export goods packaging as it meets environmental rules and regulations that many countries follow.

**Product performance**

- Packaging for high-end electronic parts that are sensitive to a static electricity, ceramic ware, glass products, etc.
- Packaging for airmail, parcel post, personal belongings to be moved, mail-ordered products, and export goods packaging that requires biodegradability
- Breakage prevention against various chemicals and pharmaceuticals and dangerous articles, learning material for infants

**Korea UB Clean Co, Ltd.**

459-11, Gilseong-ri, Hyangnam-myeon, Hwaseong-si, Gyeonggi-do, 445-921, Republic of Korea

Tel +82-1600-1649 Fax +82-359-9177

E-mail ub@kubc.co.kr

URL www.kubc.co.kr

Available in: Japan, Oceania, Europe, North America, Middle and Near East, Republic of Korea, China

#### EM-4-002 Foam

**Non-fluorocarbon Urethane insulation**

**Environmental performance**

Bridgestone commercialized insulation material by applying non-Freon foaming technology and foam-on-spot spray technique. Rigid Urethane foam "everlight NFNR" is non-Freon with high insulation property, contributes to energy save by improving efficiency of air-condition. Comparison of LCA assessment between Freon and non-Freon insulation indicates non-Freon has less impact on global warm than Freon insulation 50 years after house built even Freon remained in it has been recycled and decomposed. Bridgestone won Environment Minister Prize of The 8th Ozon Preservation and Global Warm Prevention Prize in 2005 by this technique and LCA assessment.

**Product performance**

- Environment friendly non-Freon product (zero Ozon-depleting substance/global warm control)
- on-the-spot spray by existing foaming machine all seasons
- JIS class 3 flame retardant product
- Low thermal conductivity/stable thermal insulation property

**Bridgestone Corporation**

1-6-6, Yaesu, Chuo-ku, Tokyo, 103-0028, Japan

Tel +81-3-5202-6830 Fax +81-3-5202-6833

URL http://www.bridgestone.co.jp/english/index.html
## Eco-materials // Foam

### EM-4-003

**SOFTYCELL-ONE**

**Insulation material**

<table>
<thead>
<tr>
<th>Environmental performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluoro Carbon-free Rigid polyurethane foam for Spraying system energy-saving products with Heat Insulation in houses</td>
</tr>
</tbody>
</table>

**KURABO INDUSTRIES LTD.**

4-31,2-chome, kyutaromachi, chuo-ku, osaka, Japan

URL: http://www.kurabo.co.jp

Available in: Japan

### EM-4-004

**phenolic foam insulation**

**Environmental performance**

The use of combustible hydrocarbon gas as a blowing agent and flame resistant property of the product are both accomplished by its unique foaming technology. It contributes to the prevention of the ozone layer and the mitigation of global warming by not using Freon gases. Furthermore, we realized high heat insulation performance, which is well over that of the conventional products (by 1.5-2 times). It is the product with long-lasting thermal resistance, significantly administering to high athermalize (energy-saving) of the structures.

**ASAHI KASEI CONSTRUCTION MATERIALS CORPORATION**

1-105 Kanda Jinbocho, Chiyoda-ku, Tokyo, 101-8101, Japan

Tel: +81-3-3296-3529 Fax: +81-3-3296-3535

URL: http://www.asahikasei-kenzai.com

Available in: Japan
## Tow Sheet, maintenance and reinforcement material for concrete structures

**Environmental performance**
Carbon-fiber sheet is affixed over the surface of concrete with resin adhesive. This work is easy and resists rust, thus contributing to the extended life of facilities and buildings.

**Product performance**
As many highways are increasingly aged, maintenance and repairing work are in great demand to expand or extend the life of structures. The "Tow Sheet Method" supplied by Nippon Steel and Nippon Steel Composite is widely used in repairing and reinforcement work where "Tow Sheet" formed into sheet of carbon-fiber is affixed over the surface of concrete with resin adhesive. "Tow Sheet" work is easy and resists rust, thus contributing to the extended life of facilities and buildings. Nippon Steel looks forward to reducing the amount of construction waste and further to global environmental preservation through the promoted use of its "Tow Sheet".

**Nippon Steel Corporation**

2-6-3, Marunouchi, Chiyoda-ku, Tokyo, 100-8071, Japan
Tel +81-3-6867-2566 Fax +81-3-6867-4999
E-mail kankyyo@nsc.co.jp

## Soil improvement and planting material for highly acidic soil, "fA Zeolite"

**Environmental performance**
fA Zeolite is a zeolite synthesized by a hydrothermal conversion between coal ash (a major industrial waste) and an alkaline aqueous solution. Coal ash provides a rich source of SiO₂ and Al₂O₃ as feedstock for zeolite synthesis. fA Zeolite also has the characteristics of activated carbon, which is produced by alkali activation of unburned carbon, and of ceramic due to the mullite it contains.

[fA Improvement and Planting Material for Highly Acidic Soil]
fA Zeolite has the following effects, which serve to improve marine-clay-and-pyrite-containing highly acidic soil, with a pH level of 2 that is rapidly oxidized and sterilized when it is dug up during construction work, etc.:
* anti-proliferation against iron-oxidizing and sulfur-oxidizing bacteria.
* neutralization to improve the soil.
* absorption of soil-heavy-metal leached with a strong oxidant.
* rich in nutrients (CEC 200 cmol+/kg or over).
* afforestation of soil in barren areas with the product’s water-retaining characteristic.

**HIKARIAGAOKA CORPORATION**

J.CITY 17FL 5-8-20, Takamatsu, Nerima-ku, Tokyo, 179-0075, Japan
Tel +81-3-5372-4615 Fax +81-3-5372-4626
URL http://www.jcity-hikari.co.jp
URL http://www.eco-spice.jp/
Available in: Japan
Lead and arsenic-free optical glass (Eco-glass)

**Environmental performance**
There are more than 100 types of optical glass, and in the past, generally, lead and arsenic have been used in most of them as constituents. However these two elements have high risks to cause the environment pollution. So, Nikon has developed nearly full types of optical glass not containing these two elements, and has applied them to Nikon’s optical products wholly.

**Product performance**
Optical glass has, in general, high transmission, high homogeneity and optical constants, and is used for lenses or prisms of various types of optical products, for example, cameras, microscopes, etc. In Nikon, optical glasses have been developed under cooperation with optical design division, and Nikon has established production technologies and mass-production structure based on Nikon’s own glass production equipments. And, high quality of optical glasses produced by them have contributed to high performances of Nikon’s products.

Nikon Corporation
Fuji Bldg., 2-3, Marunouchi 3-chome, Chiyoda-ku, Tokyo, 100-8331, Japan
Tel +81-3-3214-5311
URL http://nikon.com/
Available in: Worldwide

P4246 High Slag Portland Blast Furnace Cement (HSPBFC) is a homogeneous blend of OPC and GGBS

**Environmental performance**
GGBS emits 20 times less CO2 as compared to OPC. In P4246 HSPBFC, GGBS replaces a high percentage of OPC, up to 75%. GGBS replaces OPC, a material that contributes about 1 ton of CO2 for each ton of OPC produced. By using more GGBS, it helps to conserve primary resources, reduce CO2 emissions caused by OPC, and enhance a building’s energy efficiency through mitigation of the heat island effect.

**Product performance**
Key features of HSBFC
1) Good workability
2) Prolonged slump retention
3) Higher ultimate compressive strength
4) Higher flexural strength
5) More aesthetically pleasing appearance of lighter color in HSBFC concrete Key benefits of using HSBFC
1) Reduces the risk of early-age thermal cracking especially in mass concreting
2) Improves resistance to sulphate and chloride attacks on concrete, especially for marine structures
3) Eliminates the risk of damage caused by alkali-silica reaction (ASR) in concrete
4) Improves long-term strength development of concrete

EnGro Corporation Ltd.
29 International Business Park, #08-05/06 Acer Building Tower B, 609923, Singapore
Tel +65-6561-7978 Fax +65-6561-9770
E-mail vincent.loh@engro-global.com
URL www.engro-global.com

EnGro’s P4246 brand of HSPBFC is Green Label certified
**Eco-materials // Ceramics and glass**

### EM-5-005

**Ceramics and glass**

ceramic bearing balls

**Long Life, High Reliability and Anticorrosion Minimize Environmental Impacts**

**Environmental performance**
- Mitigation of climate change: Reduction in the rotational energy loss of ball bearings.
- Efficient use of resources: Resource saving as a result of longer ball bearing life (5 times longer compared to steel bearing). Reduction in the waste of worn-out bearings because our ceramic bearings do not require frequent replacement.
- Management of chemicals: Environmentally beneficial reduction in the amount of bearing grease required.

**Product performance**
- Maintenance saving: Easy maintenance thanks to a highly durable and reliable generator bearing system which is substantially free from electric corrosion because of its ceramic balls’ good insulation property.

**Toshiba Materials Co., Ltd.**

1-1, Shibaura 1-Chome, Minato-Ku, Tokyo, 105-8001, Japan
Tel +81-3-3457-4875 Fax +81-3-5444-9235
URL http://www.toshiba.co.jp/index.htm
URL http://www.toshiba-tmat.co.jp/tmat/corp/env.htm

![Ceramic balls for windmill power generator bearings](image)

### EM-5-006

**Ceramics and glass**

carbon-fiber sheets for repairing

**Granulated Blast-Furnace Slag, Superior alternate material for clinker and cement**

**Environmental performance**
Reducing CO₂ emission about 40% compared with the ordinary cement producing.

**Product performance**
The Granulated Blast-Furnace Slag ("GBFS") is produced by rapid granulation of molten slag that is obtained during the iron making process. GBFS primarily consists of CaO and SiO₂ together with minor chemical components. GBFS can be used as an alternate of clinker that is the raw material of cement. Especially, GBFS shows excellent hydration character when it is further ground, which is called Ground Granulated Blast-Furnace Slag ("GGBFS"). The character of GBFS or GGBFS has been widely known as an excellent alternate of clinker or cement. GBFS and GGBFS contributes to reduce CO₂ emission amount equal to 700Kg per each metric ton of GBFS or GGBFS through energy and natural resource saving during clinker burning process and cement production once GBFS or GGBFS are used instead of clinker and cement.

**Nippon Steel Corporation**

2-6-1, Marunouchi, Chiyoda-ku, Tokyo, 100-8071, Japan
Tel +81-3-6867-2566 Fax +81-3-6867-4999
E-mail kankyok@nsc.co.jp

![Segments (GBFS,GGBFS are blended)](image)
Eco-materials // Ceramics and glass

### EM-5-007

**Marine Block®**

**Environmental performance**

JFE has been developing restoration technologies for marine environments by utilizing steel slag, which is a byproduct of manufacturing. Porous Marine Block®, which is JFE's block product made from steel slag and CO₂ through a solidification reaction, has been adopted for coral reef restoration works in Sekisaishoko on a trial basis. So far, good results have been observed. Marine Block® has also been used in rejuvenation experiments for seaweed reefs close to Japan because of its excellent performance as an implantation base for seaweed.

**JFE Steel Corporation**

2-3, Uchisaiwai-cho 2-chome, Chiyoda-ku, Tokyo, 100-0011, Japan

Tel +81-3-3597-3111 Fax +81-3-3597-4860

URL http://www.jfe-steel.co.jp/

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### EM-5-008

**Polycrystalline Silicon** (Materials for solar power systems)

**Environmental performance**

Global warming is an urgent issue not only for human beings but also any lives on the globe now. We are contributing to preservation and restoration of the natural environment on the earth by supplying polycrystalline silicon.

**Product performance**

We are producing polycrystalline silicon for semiconductor and solar cell from metallurgical silicon by Siemens process. The polycrystalline silicon for solar cells is a major raw material for photovoltaic industry and the energy generated from solar cells is clean without any generation of CO₂.

**Mitsubishi Materials Corporation** (Yokkaichi Plant)

5 Mita-cho, Yokkaichi, Mie, 510-0841, Japan

Tel +81-59-345-5191 Fax +81-59-346-5815

E-mail toishii@mmc.co.jp


Available in: Japan, Europe, Southeast Asia, U.S.A., China
**EM-5-009**

**Ceramics and glass**

**Columnar-crystal large-diameter silicon for solar cell and silicon parts**

**Environmental performance**

From the viewpoint of the global environmental problems, the product contributes to energy saving and CO₂ emission reduction as solar cells. Our product is superior in the efficiency of component manufacturing owing to its large diameter (square type: 1050 x 1050mm, circular type: Φ 1050). This reveals an environmentally low-load manufacturing process.

**Product performance**

The product is excellent in machining characteristics, mechanical strength, and chemical resistance, compared with the poly-crystal products prepared by other methods. Moreover, it has the performance at almost the same level as that of single crystal. It is therefore expected as a substitute in the field where the single crystal has been used. Since a large-diameter product can be made, the demand for columnar silicon crystal is rapidly increasing in fields where SiC, quartz and carbon have been used.

**Mitsubishi Materials Electronic Chemicals Co., Ltd.**

3-1-6 Barajima, Akita City, Akita, 010-8585, Japan
Tel +81-18-864-6011 Fax +81-18-864-4002

Available in: Worldwide

Columnar Crystal Silicon of plate type
EM-6-001 Composites

An Asphalt Pavement Material Utilizing The Shells of Scallop

Environmental performance

"Shell such as scallops" that worries to the processing is effectively used by an industrial by-product materials partially of the aggregate of the pavement material.

The shell is crushed to 20mm or less, and mixes with the hot asphalt mixture by 20~30% (weight ratio).

Watanabesato.co.ltd.
1-18-4 minamiazabu minatoku tokyoto, Japan

Available in: Japan

EM-6-002 Composites

FireNo

Environmental performance

1. No release Formaldehyde.
2. No release 1,3-butadiene.
3. No release VOCs.

Product performance

FireNo is a superior fire-resisting product. it is suited to every public building interior materials, transprotation floor coverings, materials of industrial components etc.

it prevents any fire from being out of control by using its excellent nonflammable and nontoxic efficiency.

Jin Sung Industrial Co
901-5,Goe-Dong,Nam-Gu,Pohang,Gyeong Buk, 790-300, Republic of Korea
Tel +82-54-286-3100 Fax +82-54-271-3002
E-mail kelly76com@paran.com
URL www.jsrubber.co.kr
URL www.jsrubber.co.kr

Available in: Worldwide, Republic of Korea
**EM-6-003 Composites**

**Sulfron™ improves fuel consumption and enhances the durability of tires**

**Environmental performance**
Sulfron™ contributes to automobiles CO₂ reduction by a 5% improvement in fuel consumption.

**Product performance**
Sulfron™, a modified aramid derived from Twaron®, is a unique rubber ingredient that has been chemically processed from cut fiber. When absorbed by the tread of a tire, it disperses inside the rubber and as it conforms to the rubber, the tire becomes more durable. It also reduces rolling resistance, which improves fuel efficiency.

Performance of Sulfron:
1. Improves fuel consumption by 5%
2. Increases tire durability by suppressing heating while moving
3. Prevents tire tread cracking

**Teijin Aramid BV**
Westervoortsedijk 73 P.O.Box 9600 6800 TC Arnhem, The Netherlands, 100-8585, Japan
Tel +31-26-366-4396 Fax +31-26-366-4110
E-mail k.kashiwagi@teijin.co.jp
URL http://www.teijinaramid.com/

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**EM-6-004 Composites**

**Raw material for environment-related recycled products, FREBO**

**Environmental performance**
FREBO (Furukawa Recycle Ecology Board) is a recycled raw material produced by mixing waste woodchips from saw mills and disposed plastic raw material. It has the following features:
1. Environmentally-friendly newly-established standards JISA 5741 (combined material of recycled lumber and plastic; certified)
2. The amount of CO₂ emissions during manufacturing is 179 kg of CO₂/t, a reduction of 20 - 30% compared with other wooden boards (220 - 250 kg of CO₂/t).
3. Complete recycling is possible since the used products can be reproduced as raw material.
4. The amount of emitted formaldehyde has passed the F-standards, which is set on building-material boards (It should be 0.3 mg/l or less on average and 0.4 mg/l at a maximum).

**Product performance**
1. Outstanding water resistance
   * Water absorption rate: 5.0% *1
   * Thickness-expansion ratio by water absorption: 2.0% *2
2. Excellent noise-barrier performance
   * Reduction of floor-impact noise by roughly 2-4 dB with light-weight materials and by 1 dB with heavy-weight materials *3
3. Extremely tolerant against wear
   * 0.05 g or below *4
   * JAS flooring standards

**FURUKAWA Co., Ltd.**
884-61, Chuganji, Soeda-machi, Tagawa-gun, Fukuoka, Japan

Available in: Japan
### EM-6-005 Composites

#### Recycled wood (Toppan Material Wood)

**Environmental performance**
Toppan Material Wood is a recycled industrial material made entirely from waste and waste plastic. This industrial material can be re-crushed and recycled time and time again with no change in its original form and function.

**Product performance**
- High processability
- Steady strength
- High strength
- Anti-bacillus corrosion
- Water-proofing, weather resistant

"TOPPAN MATERIAL WOOD" is a product sold by Toppan Cosmo, Inc. that employs ECO-M-WOOD, a product for which ECOWOOD Co. Ltd. has acquired an Ecomark authorization number.

**TOPPAN COSMO, INC.**
Toppan Shibaura Building, 26-19-3, Shibaura, Minato-ku, Tokyo, 108-8536, Japan
Tel +81-3-5418-3500 Fax +81-3-5418-3704
E-mail eco@toppan.co.jp
URL http://www.toppan.co.jp/english/csr/

### EM-6-006 Composites

#### Water-based Emulsion adhesive products with various foams "AH sheet"

**Environmental performance**
Ever-light AH sheet is a kind of product combined with flexible urethane foam technique and the latest adhesion technique. It is a flexible high performance polyurethane sheet with adhesive on it. By using this sheet, it becomes easier to adhere requested foam with other substances. Conventional organic solvent product may cause air pollution and result in sickhouse syndrome. Instead of organic solvent, water is used to make AH sheet a water-based emulsion adhesive which is unharmed. Removable Ever-light AH sheet for industrial use has been developed as well for the purpose of reuse of parts and release or separate of unnecessary parts.

**Bridgestone Corporation**
1-6-6, Yaezu, Chuo-ku, Tokyo, 103-0028, Japan
Tel +81-3-5202-6830 Fax +81-3-5202-6833
URL http://www.bridgestone.co.jp/english/index.html
### EM-6-007

**Adhesive for interior decoration**

**Environmental performance**
- Environmentally friendly adhesive
- Plasticizer-free water based adhesive
  (Plasticizers are essentially VOC components, and such VOC components particularly in adhesives for use in housing are suspected to be causative substances for Sick House Syndrome.)

**Product performance**
- Excellent bond strength and fast setting
- Good compatibility with urea resin
- Adaptable to spreading machines
- No contamination or damage to substrates and mechanical devices
- Adaptable to hot and cold press

**OKONG CORP.**

621-7 Namchon-dong, Namdong-gu, Incheon, 405-846, Korea
Tel +82-32-822-5050 Fax +82-32-817-5061
E-mail okskg@hanafos.com

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### EM-6-008

**Kyokawaraito**

**Environmental performance**
- Reduction of Waste
  1. The total amount of clay-roof-tile waste caused by the dismantling of buildings reaches approximately 2 - 3 million tons a year in Japan, which is either reclaimed or discarded in the ocean
  2. The clay-roof-tiles disposed of in Kyoto are crushed and controlled in size, then alien substances are removed before the product is processed into powder to realize 100% recycling. The recycled material is processed into yarn.
  3. The more recycled, the more waste is cut.

**Product performance**
Yarn, into which roof-tiles are kneaded, generates more far-infrared rays and negative ions than conventional yarn.

**Kokuyou CO.,Ldt**

92-1 Miyanogo, Simomisu, Yokoooji, Husimi, Kyoto, Kyoto, 573-0021, Japan
Tel +81-756224417
E-mail info@kokuyou.jp
URL http://www.kokuyou.jp
URL http://www.kokuyou.jp/sogo.html
Eco-materials // Others

**EM-7-001**

**PLA LID**

**Environmental performance**
- 100% biodegradable and compostable and environmentally friendly
- Harmless to the human body

**Product performance**
- Coffee & fast food stores - Take out stores (Beverages, ice cream, etc.)

**HANCHANG PAPER CO., LTD.**

EXCON VENTURE BLDG., 15-24, YEOUIDO-DONG, YOUNGDEUNGPO-GU, SEOUL, 150-969, KOREA
Tel +82-2-3774-5484 Fax +82-2-3774-5487
E-mail wonchoong@hanchangpaper.co.kr
URL www.hanchangpaper.co.kr

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**EM-7-002**

**KRISTAL™ Multi-functional PV System**

**Environmental performance**
The durability of Kristal™ is enhanced by the use of UV-resistant, outdoor weather-proof polyurethane (PU) which is extensively used by the automotive industry. The molded frame enables different designs and components to be embedded and hence is easily customizable. The possibility of configuring a roof or facade meeting your unique requirements is highly achievable by Kristal™.

**Product performance**
Enable your roof, facade, or wall to generate electricity, provide skylighting, and many more functions with our Kristal™ Multi-functional PV System. Grenzone Kristal™ Multi-functional PV System is a versatile customizable system that can be easily integrated for roofing, wall, or facade that has a different look and feel.

**Grenzone Pte Ltd.**

Woodlands Spectrum 1, 2 Woodlands Sector 1, #05-14, 738068, Singapore
Tel +65-6579-0560 Fax +65-6579-0561
E-mail info@grenzone.com
URL www.grenzone.com

Available in: Worldwide
**EM-7-003 Others**

**FC powder**

**Environmental performance**

FC-powder was made by recycling of validity resources (slug etc.) and it is used in hardening the soil or hardening the soft ground.

FC-powder looks like a general cement, but it is completely difference With cement in component.

FC-powder has no toxic,. So the hardening soil by FC-powder do not do harm to vegetation and finally return to natural soil not to make a industrial waste, compared with cement-structure.

The hardening soil by FC-powder is used in pavement of road for jogging, cycling & stroll etc. and it is also used in making the Eco-block of ridge between rice fields in Korea.

**FC Korea Land Co., Ltd**

Paradise1704Ho,159-6 Dongkyo-Dong, Mapo-Ku, Seoul, 121-816, Korea
Tel +822-3141-1174 Fax +822-3141-1175
E-mail fc4u@paran.com
URL www.fc4u.co.kr

Available in: Worldwide