

Helping to protect our environment with EcoPure®

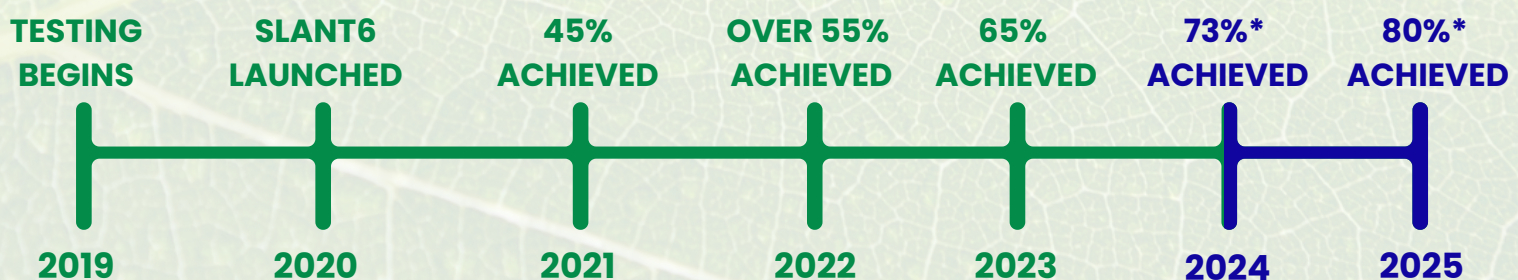


Flexible, resilient, and durable – plastics have facilitated innovation and convenience in almost every area of life. From our medical and building supplies to food storage containers, plastic is a commonplace and inexpensive solution for many the world over. Unfortunately, plastic is not without its flaws, and a lack of comprehensive recycling facilities results in much larger quantities than necessary, heading for landfill when they could and should be recycled. Over the next couple of pages you'll find out how we're trying to turn this negative into a positive!

Why have we chosen to partner with EcoPure®?

Our 100% recyclable urinal screens are manufactured using a polymer called EVA. The challenge for us is that recycling programmes vary from region to region and there are no guarantees that the products will be widely recycled, particularly when we consider the urinal screens. We therefore wanted a failsafe. With EcoPure® we've achieved 68.9% biodegradation of our Slant6 urinal screen in less than five years of testing (Feb 2024). As a brand that takes our responsibility to the environment really seriously, we are on a crusade to make our products as environmentally friendly as possible and EcoPure® is just the beginning of our sustainable product evolution.

The biodegradation story so far with the Slant6



Independent long term testing at Eden Research Laboratory in the USA to the ASTM D 5511 test standard. This test simulates landfill conditions.

*Targets based on estimated biodegradation using evidence gathered so far (Updated Feb 2024). Future timeline may adjust depending on results.

Helping to make plastic environmentally friendly with EcoPure®

What is Biodegradation?

Biodegradation is defined as "A process by which microbial organisms transform or alter (through metabolic or enzymatic action) the structure of chemicals introduced into the environment." Organic (carbon-based) material is changed through chemical processes from complex molecules into simpler molecules, eventually returning the molecules into the environment. For example, a banana peel can be reduced from cellulose to water, carbon dioxide gas, and humus in a compost pile.

The biodegradation process breaks down everything from garden waste to crude oil. It is a natural process that keeps our planet clean and healthy. Unfortunately, the rate at which we are producing waste far outpaces the rate of natural biodegradation, leading to an unsustainable state. As landfills fill up at record rates, air, water and soil pollution is increasing.

Normal Plastic Biodegradation

Common plastics biodegrade very slowly. So slowly that most plastics and polymers are considered non-biodegradable. Plastic degradation rates can vary widely depending on the exact type of plastic. Most plastics biodegrade in roughly 200-1000 years in a landfill or natural environment. Estimates of degradation times for plastic bags range from 100-500 years, while plastic bottles are reported as over 200 and up to 450 years.

Phases of Biodegradation with EcoPure®

As we've already mentioned, the normal plastic biodegradation process can take hundreds and sometimes even thousands of years to complete. However, with the organic plastic additive, EcoPure®, the process is significantly accelerated. EcoPure® plastics complete the biodegradation* process at much higher rates following the processes on the next page.

Aerobic Phase (first few days)

In this phase, the enzymes and decomposition chemicals act as a catalyst to the biofilm, coating the plastic. During this time, aerobic microbes are becoming established and moisture is building up in the refuse. Standard plastic moisture absorption capability is relatively small, but the additive causes further swelling, weakening the polymer bonds. This creates molecular spaces for microbial growth, which begins the aerobic degradation process in which oxygen is converted to CO₂.

Anaerobic, Methanogenic Unsteady Phase (approx. 6 - 18 months)

The microbe colonies continue to grow, eating away at the polymer chain and creating increasingly larger molecular spaces. During this phase acetogenesis occurs, converting fatty acids into acetic acid, carbon dioxide and hydrogen. As this process continues, CO₂ rates decline and hydrogen production eventually ceases.

Anaerobic, Non-Methanogenic Phase (around 2 weeks to six months)

After oxygen concentrations have declined sufficiently, the anaerobic processes begin. During the initial stage (hydrolysis), the microbe colonies eat the particulates, and through an enzymatic process, reduce large polymers into simpler monomers. The organic additive causes additional swelling and opening of the polymer chain and increased quorum sensing. This further excites the microbes to increase their colonization and consumption of the polymer chain. As time progresses, acidogenesis occurs where the simple monomers are converted into fatty acids.

Anaerobic, Methanogenic Steady Phase (approx. 18 months to 10 years)

The final stage of decomposition involves methanogenesis. As colonies of microbes continue to eat away at the remaining surface of the polymer, acetates are converted into methane and carbon dioxide, and hydrogen is consumed. The process continues until the only remaining element is humus (highly nutritional soil).

How does EcoPure work?

EcoPure® accelerates the biodegradation of treated plastics in microbe-rich environments. Plastics treated with EcoPure® have unlimited shelf life and are completely non-toxic. Bio-Tec discovered an organic compound within crude oil that is burned out during the cracking process that is synthesized with nutrients and then grafted on to the plastic polymer chain. Adding EcoPure® to a petroleum based resin attracts microbes to the product allowing them to control their PH level and become quorum sensing and colonize on the surface of the plastic. Once the microbes have colonized on the plastic they secrete acids that break down the polymer chain. Microbes utilize the carbon backbone of the polymer chain as an energy source. The difference between EcoPure® treated plastic and traditional plastic is that EcoPure® creates an opportunity for microbes to utilize plastic as food

What prevents plastics made with EcoPure® from degrading while in storage on the shelf

EcoPure® treated products must be disposed of or kept in active microbial environments (such as landfill) in order to biodegrade. Our products are sealed and will therefore not be exposed to the microbes needed for biodegradation to commence.

So does this mean that SGI products treated with EcoPure are Oxo-degradable?

No. Oxo-degradable plastic is the same as regular plastic, but with a metal additive added, making the material break down within 6-18 months. No special conditions needed, just air. Sounds amazing right? The problem with oxo-degradables is that the metallic additive added to the plastic makes the material unrecyclable as it would contaminate other fully recyclable plastics. Even worse, when oxo-degradable plastic breaks down, it breaks down into thousands and thousands of tiny microplastics. Microplastics are just about as bad as it gets; small doesn't mean harmless, and due to their size, they're easily consumed by marine life and can kill them. Microplastics have been detected in fish, in our food chains and our drinking water. Thanks to EcoPure® our Slant6 remains 100% recyclable and testing has shown that it does not break down into smaller microplastics during the biodegradation process. Instead it remains solid until gradually converting into carbon dioxide, methane and eventually biomass.

Is EcoPure® toxic?

EcoPure® is not toxic and is actually FDA approved in the USA, making it safe for use in food contact applications.

Does EcoPure® contain any heavy metals or contaminants?

EcoPure® does not contain any compounds that would be considered heavy metals, light metals or metal ions. EcoPure® is a combination of true organic compounds and other nutrients found in the natural environment

Does EcoPure® contain microbes?

No, EcoPure® is an additive composed of organic compounds that attract microbes when placed into microbe-rich environments. There are no enzymes or microbes within the EcoPure® additive.

Are EcoPure® treated products compostable to ASTM D 6400?

Plastics made with EcoPure® are biodegradable in both aerobic (composting) and anaerobic (landfill) environments. The customary disposal method for plastic is landfilling, not composting, so EcoPure® has been engineered to perform best in anaerobic environments. EcoPure® is not designed to biodegrade plastics in the timeframe required for professional composting facilities, and so it is unlikely they will meet the ASTM D 6400 standard.

Are there any negatives to biodegradation?

No, biodegradation is a natural process that is essential in maintaining our planet's ecosystem and nutrient cycles. The challenge is that globally we produce too much waste which doesn't biodegrade within a sensible timeframe or just simply degrades over 100's of years. The waste gasses (such as methane) produced through the process of plastic biodegradation are manageable and even economically useful for providing energy.

Will any polymer / plastic remain once the biodegradation process is complete?

No, the microbes utilize the carbon backbone of the polymer chain. Microbes use the carbon for energy and leave nothing of the polymer behind when the process of digestion is complete. At this point, only biomass will remain which is essentially organic matter similar to soil or dirt. It is made up of nutrients and the remains of bacterial colonies.