Accelerating the
biodegradation process
with sustainable yarns
YARNAWAY™
by
ANTEX

As a result of economic growth and the impact of consumer society, the ecosystem is increasingly threatened.

Biodegradation

Biodegradation is a process in which the molecular structure of materials is broken down through metabolic or enzymatic processes. The decomposition process occurs through enzymes secreted by microorganisms, naturally present in anaerobic (without oxygen) and aerobic (with oxygen) environments that work alone or in colonies and play a vital role in our ecosystem, and not only in the biodegradation process.

Biomass (humus) and biogas (carbon dioxide and methane) are the products generated in a biodegradation process.

While initial biodegradation in nature is aerobic, the main bioreaction in landfills is anaerobic biodigestion. Landfill microbes break down organic matter and reduce its volume or mass.

Yarnaway yarns are modified by a mixture of organic compounds, based on EcoLogic Eco-one® technology, that do not interfere with the properties of the final product, whether they are textured yarns, solutiondyed or package dyed colours, as well as storage and use in general textile processes. In other words, lifespan and performance during use remain unchanged compared to any polyester yarn.

Only when Yarnaway yarns are exposed to an environment that has moisture and microorganisms, such as a biologically active landfill, will the polymer change process begin.

ASTM / ISO Test methods and specifications for biodegradation of plastics

For anaerobic biodegradation, the ASTM D5511 test method, equivalent to ISO DIS15985 (International Standards), is widely used to determine biodegradation under conditions of high solids content. It determines the degree of biodegradation of plastic materials and is representative of the conditions of biologically active landfills.

The ASTM D5511 analysis method under which the Antex Yarnaway yarns were analyzed showed that the Yarnaway yarns are anaerobically biodegradable. During the standard test evaluation, there was a significant biodegradation of the samples of the textured yarns, while the normal polyester counter test remained unchanged.

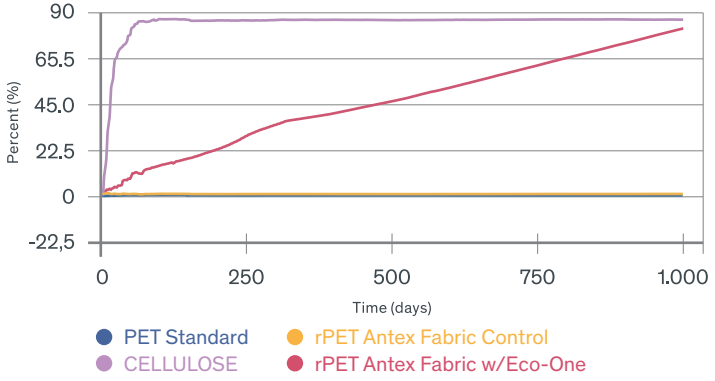
Additionally Yarnaway yarns have been tested under ASTM D6691, standard test method for determining aerobic biodegration of plastic materials in the Marine Environment, with satisfactory results.

Polyester is estimated to take about 300 years to decompose in the environment. **Yarnaway yarns dramatically reduce the decomposition period to few years.**

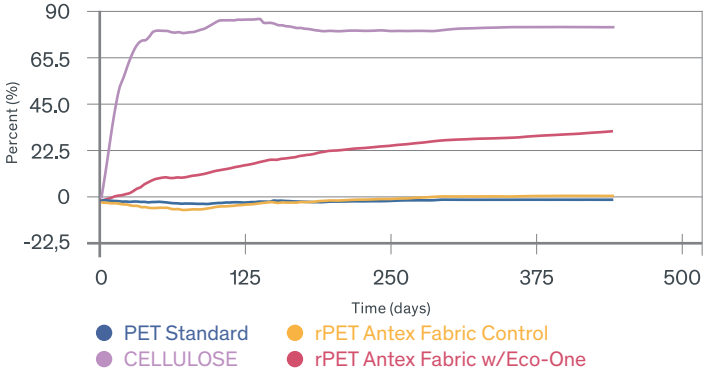
TESTED BY

Eden Research Laboratory

Biodegradation test under ASTM D5511



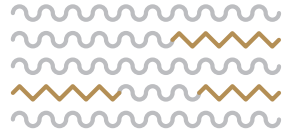
Biodegradation test under ASTM D6691



Yarnaway™ process

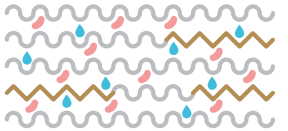
At a schematic level, the biodegradation process of the Yarnaway yarns would be as follows:

1. Biofilm formation



- Hydrophobic based resin becomes hydrophilic
- Segregated enzymes activate hygroscopic properties

2. Expansion of the polymer matrix



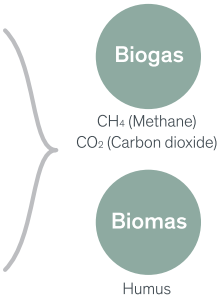
- Moisture expands the molecular structure
- Microbes gain access to the interior of the polymer matrix

3. Breakage of polymer chains

- New microbes join the process
- Polymeric chains transform into monomers

4. Continuation of polymer breakage

- Multiple species complete this complex phase
- The polymer undergoes a reduction in molecular weight



Biodegradation is one of the options to combat the large amount of plastic waste that ends up in landfills. Yarnaway yarns offer a unique solution to increase biodegradation in biologically active landfills, based on laboratory tests and scientific evidence.

Yarnaway yarns can be recycled into new textile or plastic materials. At Antex we recommend whenever possible to opt for ways of recycling waste, but we are aware that there is still much to be developed in this area and in the design of textile products, which is why we believe that Yarnaway can help reduce the impact of industry and textile products on the environment.

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OUR CERTIFICATIONS: IATF 16949 · UNE-ISO 9001:2015 · GRS · Oeko-Tex® Standard 100 · Oeko-Tex® Standard 100 FR · PAS 2050 · ISO 50001:2018