



ENERGY GUARD ST – 500 MICRON

An Award-Winning Solution to increase Solar Gains and inhibit algae

Plastipack Ltd has been awarded the 2018 Institute of Physics Business Innovation Award for the development of EnergyGuard™ Selective Transmission in collaboration with The University of Surrey. The award recognises Plastipack's excellence in innovation, delivering significant societal and economic impact through the application of Physics

What is an EnergyGuard™ Selective transmission cover?

Increasing pool temperatures and inhibiting algae growth are now possible with this innovative selective light filtering material, removing the need to compromise between temperature performance and chemical savings. Using 500µm selective transmission GeoBubble™ material, the new EnergyGuard™ Selective Transmission material offers the highest possible savings on chemical and solar heating. By using the process of selective transmission to control solar energy absorption, the water temperature is raised by up to 5°C compared to an uncovered pool, and algae growth is inhibited, making this a dual purpose pool cover and the most efficient cost-saving material available.

EnergyGuard™ Selective Transmission specific benefits:

- Increases water temperature by up to 7°C
- Inhibits algae growth
- Reduces filtration times by up to 50%
- Reduces chemical consumption by up to 60%
- Reduces energy consumption by up to 60%
- Reduces time spent on maintenance
- 6 year pro rata manufacturer's warranty
- Can be used as a winter pool cover



General cover benefits:

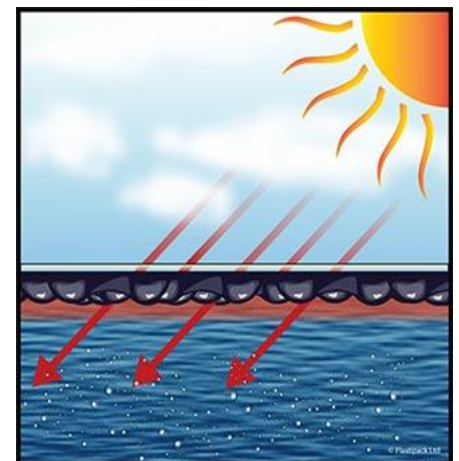
- Available with GeoBubble™ technology
- Eliminates water evaporation by 98% +
- Reduces debris contamination
- Reduces the pool's carbon footprint

What is selective transmission?

Dark, opaque materials absorb light energy more efficiently than clear materials, however water also has light absorption properties. Many wavelengths in the visible spectrum are poorly absorbed in shallow pool water, although they are still used by algae during photosynthesis.

EnergyGuard™ Selective Transmission absorbs the wavelengths that promote algae growth. This absorption heats the cover and thus the pool via conduction. The material also allows the transmission of longer wavelengths directly into the water, heating the pool.

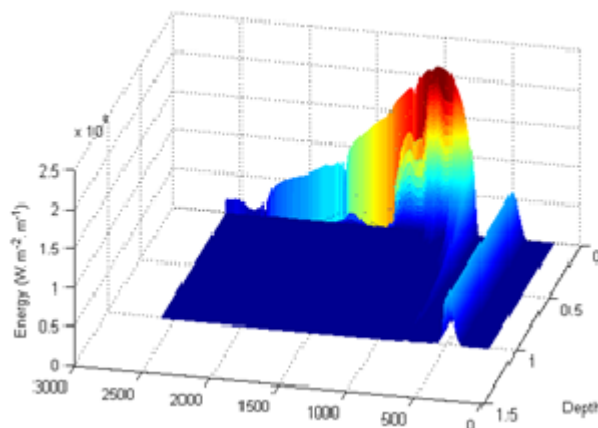
Ultimately, the light normally used by algae for growth is instead used to heat the pool, and the algae dies off. The pool is also heated by the longer wavelengths which are free to pass through the cover and into the water. Through this selective transmission process algae growth is inhibited and solar heat gain is promoted.



Research and Tests

Plastipack Ltd produced films with different pigments, exhibiting unique optical properties allowing for the absorption of light required for photosynthesis but still allowing penetration of the wavelengths key to heating water. The heating potential of the covers were then investigated through FEA (finite element analysis), a laboratory experiment using a solar simulator and product field testing.

Plastipack tested the films on their ability to inhibit algae growth. Beakers containing gelatine balls of algae (*Chlorophyta Scenedesmus Quadricauda*) were covered with the sample materials and exposed to a controlled light source. The algae's respiration was then monitored by analysing the pH of the water in which they were suspended. The material's ability to inhibit algae growth was later confirmed at field test facility where the controls were repeated and the water was tested in a natural environment during the UK's spring season.

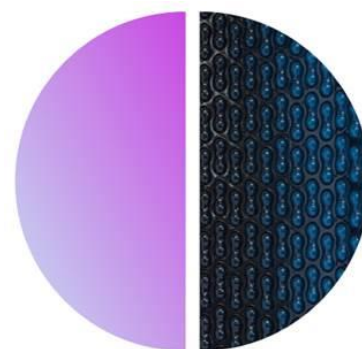


How does this translate into financial savings?

An EnergyGuard™ selective transmission cover saves money by reducing water, heating, electricity and chemical consumption. Depending on local tariffs, the cover has a payback period of approximately one year or less.

Reduce Filtration/Pump Time by up to 50%

The cover's ability to inhibit algae growth combined with the fact that debris collects on the cover, not in the pool water, means filtration time can be reduced by up to 50%, translating into a significant reduction in electricity usage. Some filtration will still be required to circulate the water and remove impurities from the pool. If the pool has heavy traffic, slightly more filtration will be needed to maintain water hygiene.



Reduce Chemical Consumption by up to 60%

There are two ways in which to control algae in a swimming pool – treatment with chemicals or by preventing its growth in the first place. The EnergyGuard™ Selective Transmission pool cover uses the latter preventative approach by controlling light entry.

On outdoor pools, approximately 90% of the chlorine is used on the oxidation of debris and then further chlorine losses occur due to the natural photolysis reaction. The EnergyGuard™ Selective Transmission material

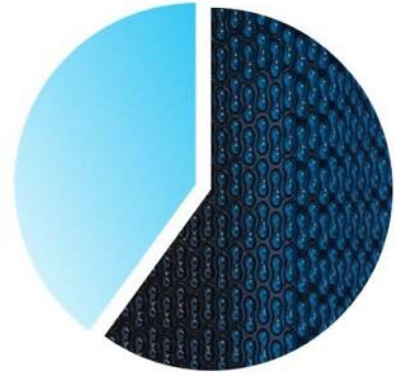
reduces this. Without the growth of algae and its impact on the water's pH, further savings are made on chemicals. Furthermore, the material prevents the loss of chlorine that typically occurs in the evaporation process.



Chemicals stay in the pool and work more effectively under an EnergyGuard™ Selective Transmission cover. Tests done in collaboration with UK universities prove that in UK conditions an average sized pool (4m x 8m) covered with the new EnergyGuard™ selective transmission material allows chemical savings of up to 60%. This equates to approximately 11kg of chlorine saved in one year.

Reduce Energy Consumption by over 60%

Pool heating costs are reduced with the new EnergyGuard™ Selective Transmission cover. Heat retention tests carried out in collaboration with two UK Universities showed energy savings of over 60%. This applied to all kinds of heating systems and, in the case of solar heating, half the amount of panels normally required for heating an uncovered pool are sufficient. On an average sized UK pool (4m x 8m) fitted with a modern heat pump, up to 5000 kWh can be saved on heating costs every year.



Eliminate Water Evaporation by 98% +

Because water can't evaporate when covered, a pool cover is an effective way to instantly lighten the pool's water footprint and conserve a precious resource. With evaporation curbed by over 98% where a pool cover is in use, the money saved on water is considerable. Research carried out in collaboration with two UK Universities showed that in the UK an average sized pool (4m x 8m) loses approximately 32,000 litres of water per year. This equates to approximately 400 baths. This figure is considerably higher in hotter climates and windy conditions.

On heated pools, water evaporation rates are always higher, so these savings are further increased where the pool has electrical or solar heat pumps/panels.



Reduce Debris:

Leaves, dirt, insects, bird droppings and other debris are not only unsightly in a swimming pool but also provide nutrients for algae and bacteria.

A pool cover keeps such contaminants out of the water, improving the water hygiene and aesthetics as well as reducing chemical consumption.



GeoBubble™ technology

The new EnergyGuard™ selective transmission material is exclusively available with GeoBubble™ technology. GeoBubble™'s patented shape increases the product's expected lifespan by improving its resistance against UV and chemical attacks typical of the harsh swimming pool environment.

Benefits to the environment:

With its ability to reduce the amount of energy required for filtration and heating, as well as its water saving properties, the new EnergyGuard™ selective transmission cover enables a far more sustainable pool with a reduced impact on the environment. At the end of its lifespan, it is 100% recyclable (Grade 4 LDPE recycling).