

Product Advisory

Gas fading

The discolouring of polyethylene is a phenomenon that is well-known in the polymer industry. It is also described as yellowing, pinking or gas fading. The colour change of the material is generally a result of the auto-oxidation of the phenolic antioxidants in the basic polymer used for a product. These phenolic antioxidants are added to the resin by the producer to protect and stabilise the polymer during processing and use. The change in colour of the polymer is strictly cosmetic and does not affect the physical properties of a product.

The sources of discolouration in polyethylene are diverse and can vary from packaging to inappropriate material composition. The most common source though comes from excessive levels of atmospheric pollutants, such as nitrogen oxides (NOx). The relatively high levels of NOx are usually caused by exhaust gasses, for example from fork lift trucks or from heaters in storage warehouses.

The chemical reaction between atmospheric NOx, even in low concentrations, and phenolic antioxidants in a polymer triggers discolouration ranging from yellow to red depending on the polymer composition. The severity of the discolouration increases with increasing exposure to NOx and from an increasing concentration of phenolic antioxidants in the polymer. Other parameters influencing the severity of discolouration are the use of titanium dioxide (TiO₂, used as white pigment) and the use of basic (high pH) additives. These reactions can occur in polymers in any form, including pellets, moulded parts, film and yarn. Pinking is especially visible in white products, because of the colour and the use of TiO₂ as the pigment.

The chemical reaction is reversible and can be eliminated with changes in the environmental conditions, by exposing the material to UV-light (sunlight). This means that, in most instances, the pinking of white yarn will disappear after installation of an outside pitch. However, when using artificial grass indoors, exposure to sunlight before installation will remove the pinking and the exposure to exhaust gasses should be minimised after installation anyway.