

## **Ingenia Flexible Packaging Brief**

## **Gas Fading – What is it?**

We have all seen it several times – what was a perfectly good film has changed color – it has become yellow or pink or tan. It's due to Gas fading. Gas fading is also known in the film industry as 'pinking' or 'yellowing'.

Normal White Film

White Film exhibiting Gas Fading

Resins and masterbatches contain Antioxidants – both Phenolic and Phosphite, present to prevent degradation of the polymer. Phenolic antioxidants are intended to act as radical traps. This process can lead to the formation of many different molecules including color bodies such as quinones. One of the most common reasons for this discolouration, is the interaction of the phenolic antioxidants with nitrous oxides and sulfurous oxides from natural gas powered equipment such as forklifts/tow motors, heating furnaces, etc. Therefore, we see a preponderance of this phenomenon during winter time – when the heating is on and all the doors and windows are closed. While gas fading changes the color of the film, it does not affect the physical properties of the film in any way.

## In addition to Nitrous and Sulfurous oxides, discolouration can also occur due to several other reasons such as;

- Reaction with the printing ink.
- Reaction with the varnish/over lacquer.
- Reaction with chemicals in liner board or kraft paper.
- Reaction with UV Inhibitor (HALS) used for outdoor exposure protection.
- pH of the system, higher the pH greater the tendency to see yellowing or pinking.
- Catalyst residues remaining in the resin.
- Titanium dioxide choice heavily treated titanium dioxides (durable grades) are less prone to gas fading as compared to non-durable grades.
- Moisture.
- Excessive heat.

A very simple way to confirm gas fading as the cause of discoloured film is to mask half of the sheet with an opaque material (to prevent exposure) and leave the other half uncovered and expose the sheet to sunlight. At the end of the day remove the mask and confirm that the unmasked portion of the film has changed back to white or natural. The colored chromophore reacts with the UV light and changes to a non-colored species.



Gas fading can be mitigated by;

- Covering the finished product with tightly sealed film to prevent interaction with the atmosphere.
- Choice of HALS (UV stabilizer).
- Antioxidant package a resin with a lower phenolic antioxidant and a greater quantity of phosphite antioxidant.
- Choice of Titanium dioxide.
- · Choice of ink and varnish.
- Selection of linerboard, kraft paper used in laminated structures.
- Use of specially formulated white MB with anti-pinking components.

## **In Summary**

Gas fading has many causal factors and requires a step by step review of the potential causes to determine the best corrective action. With the tools and experience to determine the root cause, reach out to the technical support team at Ingenia to remedy color shifts due to gas fading.

