

Atmer™ Anti-fog Additives



Anti-fogging Additives for Packaging & Agricultural Applications



Atmer™ Anti-fogging Additives

Anti-fogging additives providing excellent performance against hot and cold fogging in plastic. Performance you can see clearly.

The Atmer™ range of anti-fogging additives provide excellent performance against hot and cold fog in polyolefins, PVC and EVA films.

The anti-fogging effect allows condensed water droplets to spread into a continuous and uniform transparent layer on the surface of the film, maintaining the transparency of the film, and therefore light transmission through the film, which is especially useful in a range of applications from agricultural films to retail and food packaging.

With many physical forms, and products with a wide range of food contact approvals, there is a broad range of Atmer anti-fogging additives to choose from to suit your specific application and needs.

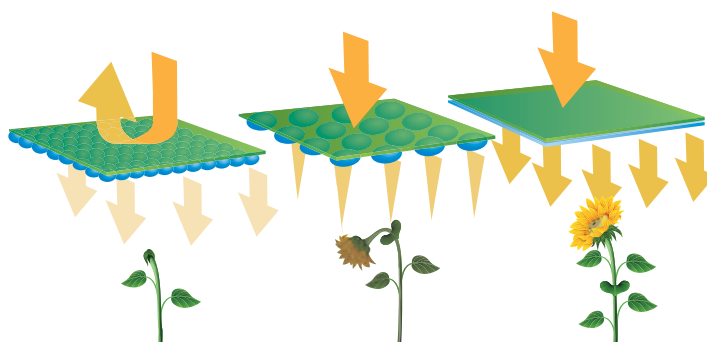
Fogging in Plastic Films

Fogging is a term used to describe the formation of small discrete droplets of water on the surface of transparent plastic films. Fogging most commonly occurs when there is a temperature differential between the inside and the outside of an enclosed atmosphere causing localized cooling at the interface.

Fog formation in food wrapping film obscures the contents, significantly reducing the aesthetic quality of the packaged food. In agricultural films it can lead to reduced light transmission with a consequent reduction in growth and crop yield. It can also cause damage to the plants due to burning from a 'lens' effect and from continuous water drip.

Keep Packaged Food Looking Good

Packaged foods can contain large amounts of moisture which causes condensation on the inside of packaging. This can make food less appealing to shoppers and in a competitive retail environment food needs to look pristine in order to stand out on supermarket shelves. Atmer anti-fogging additives prevent fog build up on the inside of packages, improving aesthetics and durability of chilled and hot foods.



Without anti-fog small droplets reflect light resulting in slower growth and ripening

Larger droplets drip and can focus light causing plant damage

Good anti-fog will result in a thin film of water which will drain away without dripping resulting in maximum light transmission with minimal plant damage



Food packaging with and without anti-fog

The Atmer additives range includes a wide variety of additives for use in both food wrap and agricultural films. All products listed in the table below are amine-free. In addition to pure products, Atmer anti-fogging agents are also available as concentrates in a polymer carrier.

Product Information

PRODUCT	DESCRIPTION	PHYSICAL FORM AT 25°C	RAW MATERIAL ORIGIN	RECOMMENDED USES
Anti-fog for Food Wrap				
Atmer™ 1006 *	Glycerol ester	Liquid	Vegetable	PE and EVA food wrap
Atmer™ 1010†	Glycerol ester	Paste	Vegetable	Cling in food wrap used in conjunction with Atmer™ 116
Atmer™ 1440 NV	Glycerol ester	Paste	Non-vegetable	Polyolefin food wrap
Atmer™ 100	Sorbitan ester	Liquid	Vegetable	PE and EVA food wrap
Atmer™ 116	Ethoxylated sorbitan ester	Liquid	Vegetable/Synthetic	Food wrap in conjunction with Atmer™ 1010
Atmer™ 7340	20% concentrate in polyethylene	Pellet	Non-vegetable	Clear food wrap applications
Atmer™ 7373	40% concentrate in polypropylene	Pellet	Non-vegetable	Long lasting benefits in polypropylene
Anti-fog for Agricultural Films				
Atmer™ 185	Glycerol ester	Microbead	Vegetable	Agricultural films especially EVA
Atmer™ 103	Sorbitan ester	Microbead	Vegetable/Non-vegetable†	LDPE and PVC agricultural films
Atmer™ 7301	50% concentrate in polyethylene	Pellet	Vegetable	Long lasting benefits in agricultural films
Atmer™ 7326	50% concentrate in universal polyolefin carrier	Pellet	Vegetable	Long lasting benefits in greenhouse films particularly triple layer films

*Only available for supply in Asia †Only available for supply in USA

Product Physical Forms

Atmer anti-fog products are available in up to four physical forms. Please check with your local sales contact for availability in your region.



Applications

Agricultural Films

Agricultural film poses an extreme challenge for anti-fogging additives with the key factor being longevity of performance. Additives have to be designed to migrate to the surface more slowly and be compatible with the polymer matrix in order to slow the rate of extraction during the service life of the film. Different climate conditions also need to be considered as a change of additive and usage levels may be required.

The use of anti-fogging additives in agricultural film causes condensed water droplets to spread into a thin continuous layer of water, which:

- Maintains light transmission of the polymer resulting in higher plant growth rates, higher crop yields per plant and earlier crop maturity
- Reduces burning of plants and crop spoilage
- Reduces constant water dripping

Polyethylene Mono Layer Films

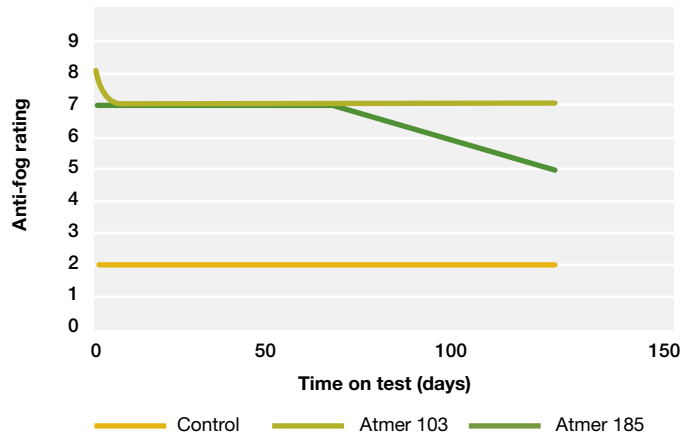
For mono layer agricultural films, the limit of film performance is typically around 12 months. Atmer™ 103 additive is recommended for use in LDPE and LLDPE based formulations.

Eva Mono Layer Films

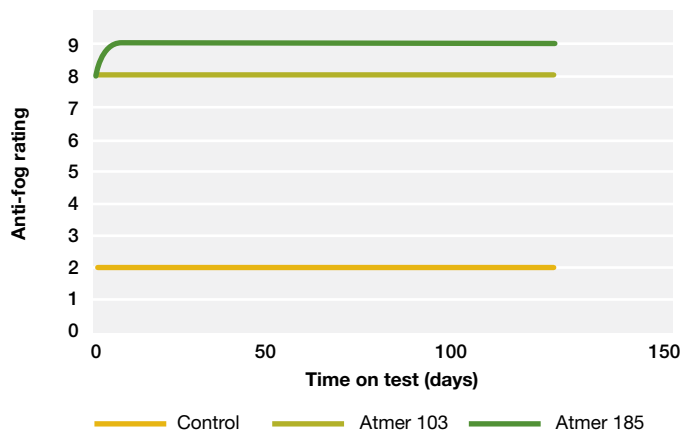
Atmer 103 and Atmer™ 185 additives can be used for low vinyl acetate (VA) content EVA films. For higher VA content EVA, Atmer 185 additive provides improved performance over Atmer 103 additive.



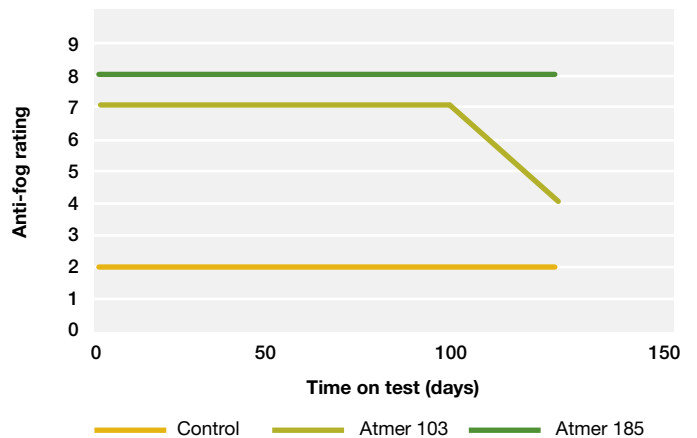
1. Comparative anti-fog performance of Atmer 103 & Atmer 185 products – accelerated greenhouse test LDPE film (180 µm) 2% additive



2. Comparative anti-fog performance of Atmer 103 & Atmer 185 products – accelerated greenhouse test EVA film (4% VA, 180 µm) 2% additive



3. Comparative anti-fog performance of Atmer 103 & Atmer 185 products – accelerated greenhouse test EVA film (18% VA, 180 µm) 2% additive



Anti-fog performance scale

1-3 No anti-fogging performance

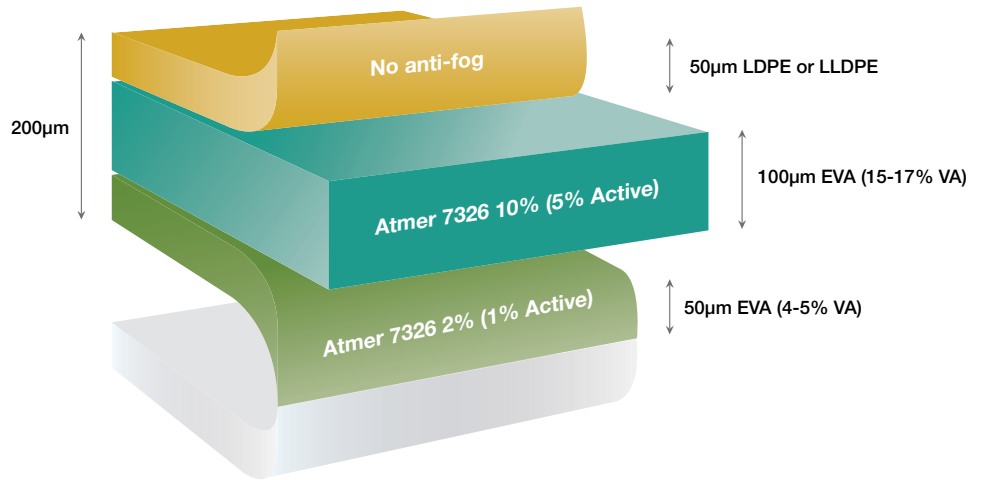
4-6 Moderate anti-fogging performance

7-9 Very good anti-fogging performance

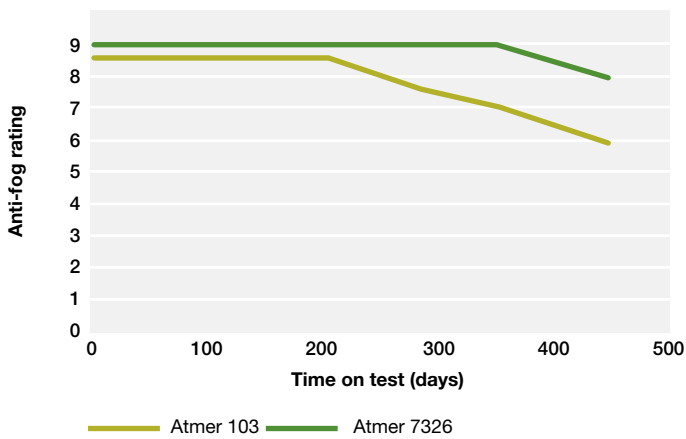
Multi-Layer Co-Extruded Films

Agricultural films commonly use a co-extruded structure to further enhance their properties. Typically these structures are employed to allow the use of the core layer of the structure to achieve a controlled release effect of the anti-fogging additive to the surface of the film. This layer will be highly loaded, usually around 5% active with a lower 1% active used in the inside skin layer. For ultimate longevity, Atmer™ 7326 additive is recommended for this type of film.

4. Cross section of three layer co-extruded film



5. Comparative anti-fog performance of Atmer™ 103 & Atmer™ 7326 products – accelerated greenhouse test three layer co-extruded film 2% additive



Applications

Food Wrap Film

By adding a suitable anti-fogging additive to food wrap film, condensed water droplets are spread into a thin continuous layer, maintaining the transparency of the packaging and the durability of the contents. This also improves the presentation of the food to look more appealing to customers. In general, food wrap applications require short term anti-fogging performance lasting only the lifetime of the packaged food.

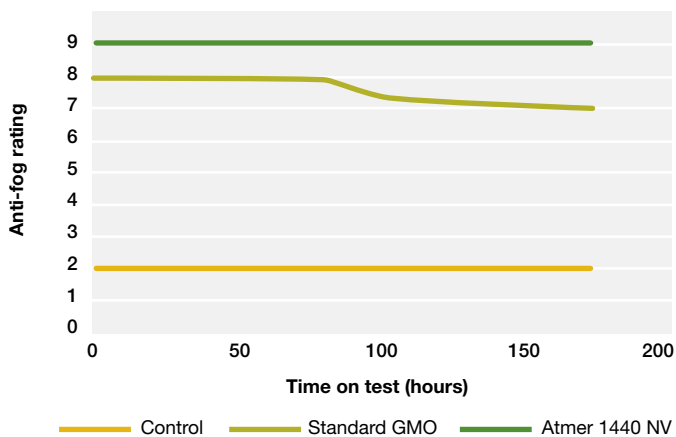
Polyethylene Mono Layer Films

Atmer™ 1440 NV and Atmer™ 100 additives are preferred for polyethylene films at a use level of 0.5 – 1.0%.

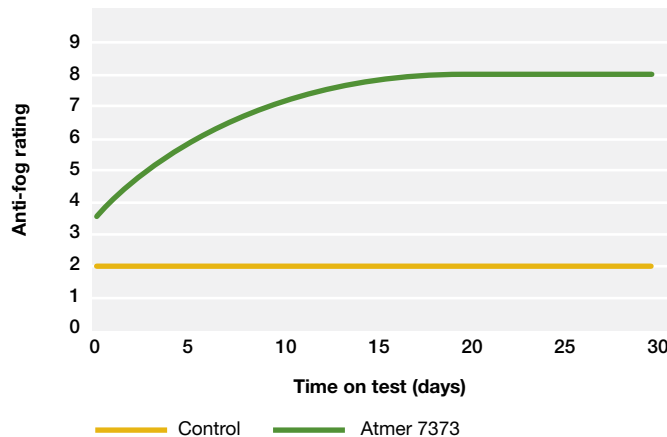
Polypropylene

Atmer™ 7373 additive is recommended for polypropylene film at a use level of 2-5%.

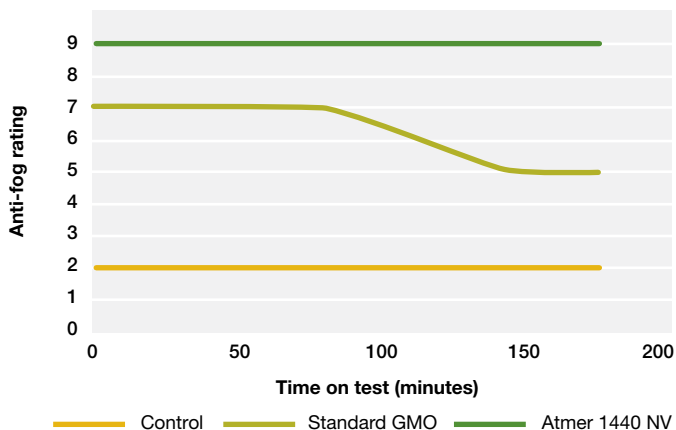
7. Comparative anti-fog performance of Atmer 1440 NV product - cold fog test LDPE film (50 µm) 1% additive



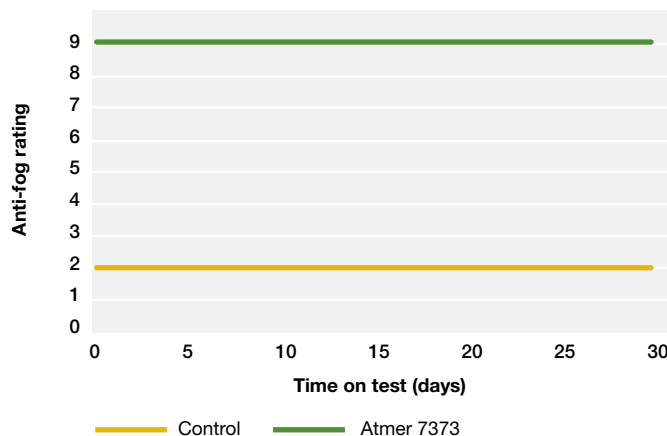
9. Comparative anti-fog performance of Atmer 7373 product - cold fog test PP homopolymer film (50 µm) 3.75% additive



8. Comparative anti-fog performance of Atmer 1440 NV product - hot fog test LDPE film (50 µm) 1% additive



10. Comparative anti-fog performance of Atmer 7373 product - cold fog test PP homopolymer film (50 µm) 3.75% additive

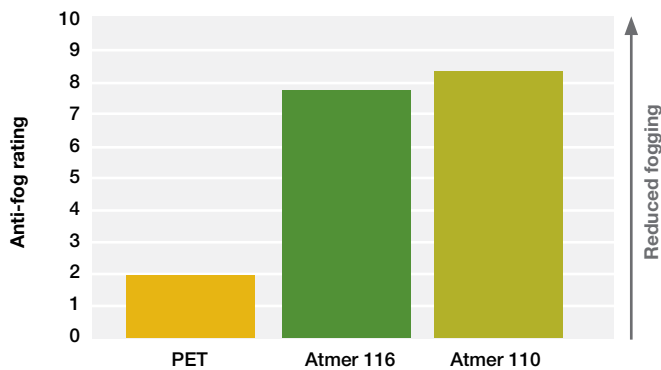


Case Study

Externally Applied Anti-Fogging Agents

Some film structures are not amenable to using migratory additives e.g. PET. In this situation, for short term anti-fog performance in food wrap the best solution is to apply an external coating of Atmer™ 116 additive or Atmer™ 110 additive. It should be dissolved in an appropriate solvent such as water or isopropyl alcohol, typically at concentrations of 1-5%. It can be applied by spraying, wet coating or dipping, depending upon the product and manufacturing process. Quantities depend upon surface area and typical requirements range from 50-200 mg/m² of active.

11. Comparative anti-fog performance of Atmer 110 and Atmer 116 products– hot fog test on PET film



Improved Fogging Performance in Polypropylene Packaging

A polypropylene film manufacturer, supplying packaging for refrigerated salads in supermarkets, was using an alternative glycerol based anti-fog additive. The supplier found that performance under cold fog conditions was especially poor, and that their customers were complaining about poor sales due to fog formation. Fog formation can mislead consumers into believing that products have been on display for a long period or are faulty making them appear unattractive.

They were supplied with Atmer™ 7373 additive, a specially formulated anti-fog for polypropylene. Having been incorporated into the polymer at 3.75%, Atmer 7373 additive dramatically reduced the amount of fog forming on the packaging. Over 95% of packages showed complete clarity and no droplet build up, with water droplets spread evenly in a continuous layer across the film.

The supplier also noted that when Atmer 7373 additive was incorporated into the film, uniform performance was achieved irrespective of position within the cabinet when compared to a glycerol based anti-fog.

Further Information

Cargill Bioindustrial sales and distribution are coordinated through an extensive worldwide network of technical and commercial experts. For further information or guidance please contact us:

polymeradditives@cargill.com

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