

Condensation Control Films

Condensation Formation

Formation of condensation on inner surfaces is a major issue in polyethylene-covered greenhouses. Condensation droplets have been shown to reduce light transmission by as much as 50%. In addition, crop damage/spots, washout on seed beds, and possible pathogen development may also occur.

AT Films condensation control films contain surface tension modifiers to prevent the formation of these condensation droplets (“fogging”). The condensation control feature is standard on Dura-Film® Thermax™.

How it Works

NOTE

A film with condensation control does not prevent condensation on the film, but instead controls the water that does inevitably condense on the film surface.

Ordinary polyethylene used in greenhouses has no affinity for water. Water that does condense on the film forms round droplets because this shape minimizes the contact between the water and the film. Due to this shape, droplets are only lightly attached to the film and hang loosely. A natural breeze or the vibration from the closing of a greenhouse door can easily make them fall.

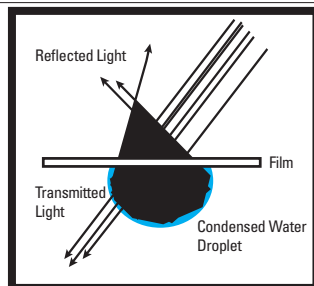


Figure 1

The shape of the droplet will also reflect light back out of the greenhouse (Figure 1). This loss of light may slow plant growth, delay crop maturity and affect plant yield. The droplets may also act as a lens, focusing sunlight onto the plants, causing burns.

A condensation control film is modified to have a high affinity for water. Condensed water no longer forms droplets (Figure 2), but instead forms a continuous thin sheet of water over the entire film surface. The advantages of a condensation control film are:

- Water is able to drain more evenly and will flow to the lowest point of the film’s surface more readily.

- Water on the film has an increased ability to flow over wrinkles that would normally be a prime location for dripping.
- Light transmission is significantly improved, often to the point of not being affected at all.
- The thin film of water will also act as an infrared absorber, which reduces nighttime heat losses, maintains leaf temperatures of the plants, and increases the overall effectiveness of the thermal film.

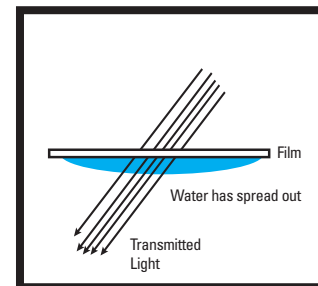


Figure 2

It’s important to allow for the normal expansion and contraction of film during installation. Single layer film should be installed snugly, but should not be overly tight. Avoid stretching the film during installation. Double poly installations should provide enough slack in the top layer to allow 12” to 24” of inflation.

The data below shows typical values provided for informational purposes only, and should not be construed as a specification.

Built-in Condensation Control

NOTE

AT Films condensation control films are manufactured with a built-in additive for superior droplet control.

To make a condensation control film, the film is modified to have the necessary high affinity for water. At AT Films, this is achieved by incorporating a unique additive into the polymeric matrix of the film during the manufacturing stage. The additive migrates to the film surface to achieve the desired effect.

Films with this kind of built-in condensation control eliminate several inherent problems with surface modification techniques used after the film has been produced. For example, the most common post-production surface coating technique for greenhouse and row covers is to use a commercial product called Sunclear (or product equivalent), which is applied like paint by spraying the film after installation. Coating of the film during the manufacturing process is not practical due to the large dimensions of the film, typically 20 to 50 feet wide and 80 to 500 feet long.



100% recyclable 100% FDA compliant

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Condensation Control Films

Problems with the post-installation treatment approach include:

- Additional labor costs to apply the coating.
- Condition of the film prior to coating affects the quality and longevity of the sprayed-on coating.
- Achievement of maximum quality and longevity of the sprayed-on coating depends on availability of a skilled applicator.

The AT Films method of using an additive incorporated into the polymeric matrix means:

- No additional labor costs to apply the coating.
- Quality and longevity of the condensation control feature is not dependent on uncontrolled factors such as film condition or applicator skill level.

Types of Condensation Control Films

NOTE

A condensation control film can be manufactured to be a "dual layer" or "directional layer" film.

Dual layer condensation control films can be installed with either side facing the crop. The condensation control additive can migrate to both the side of the film facing the crop and also to the side of the film facing the sky.

Directional condensation control films must be installed with the functional side facing the crop (Figure 3), and will be clearly marked to indicate proper installation. Directional condensation control films offer the key advantage of having the condensation control additive migrate to the side of the film where it is required (facing the crop).

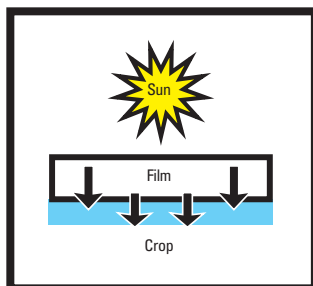


Figure 3:

Film design promotes AC additive migration to the required side
Film is labeled: "This Side Down"

Understanding Condensation Control Duration

IMPORTANT

Many factors affect the condensation control performance, duration, and quality, and these factors vary from one greenhouse to the next.

Since the additive in a condensation control film steadily migrates to the surface, the additive does get washed away with the water and more additive will migrate to the surface to replace it. Eventually all of the additive will have migrated to the film's surface and the film will be depleted of the additive. At this point, fogging (droplet formation) of the film will occur.

Many factors affect the condensation control performance, duration, and quality, which vary from one greenhouse to the next. In general, anything that reduces the rate of condensation on the film will increase the life span of the condensation control function. Factors include but are not limited to:

- Slope of the greenhouse roof.
- Greenhouse humidity and climate (plant transpiration).
- Geographical location of the greenhouse and the corresponding outside climate.
- Ventilation and growing practices employed in the greenhouse.

In addition, inventory storage will affect the condensation control film performance, due to the migratory nature of these additives. A "first in, first out" (FIFO) Inventory Management System must be used. All condensation control film products should be stored indoors, out of direct sunlight and stored at temperatures below 22 degrees C (72 degrees F). Condensation control film products should not be inventoried for more than twelve (12) months before installation on a greenhouse.

For these reasons, the performance duration of the condensation control feature is not warranted. All other customary AT Films' warranties will continue to apply.

An additional observation is that Dura-Film® Thermax™ products containing the condensation control additive can, if desired, be sprayed with a condensation control compound such as Sunclear more easily and with less run-off than regular Dura-Film® Thermax™ products.

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