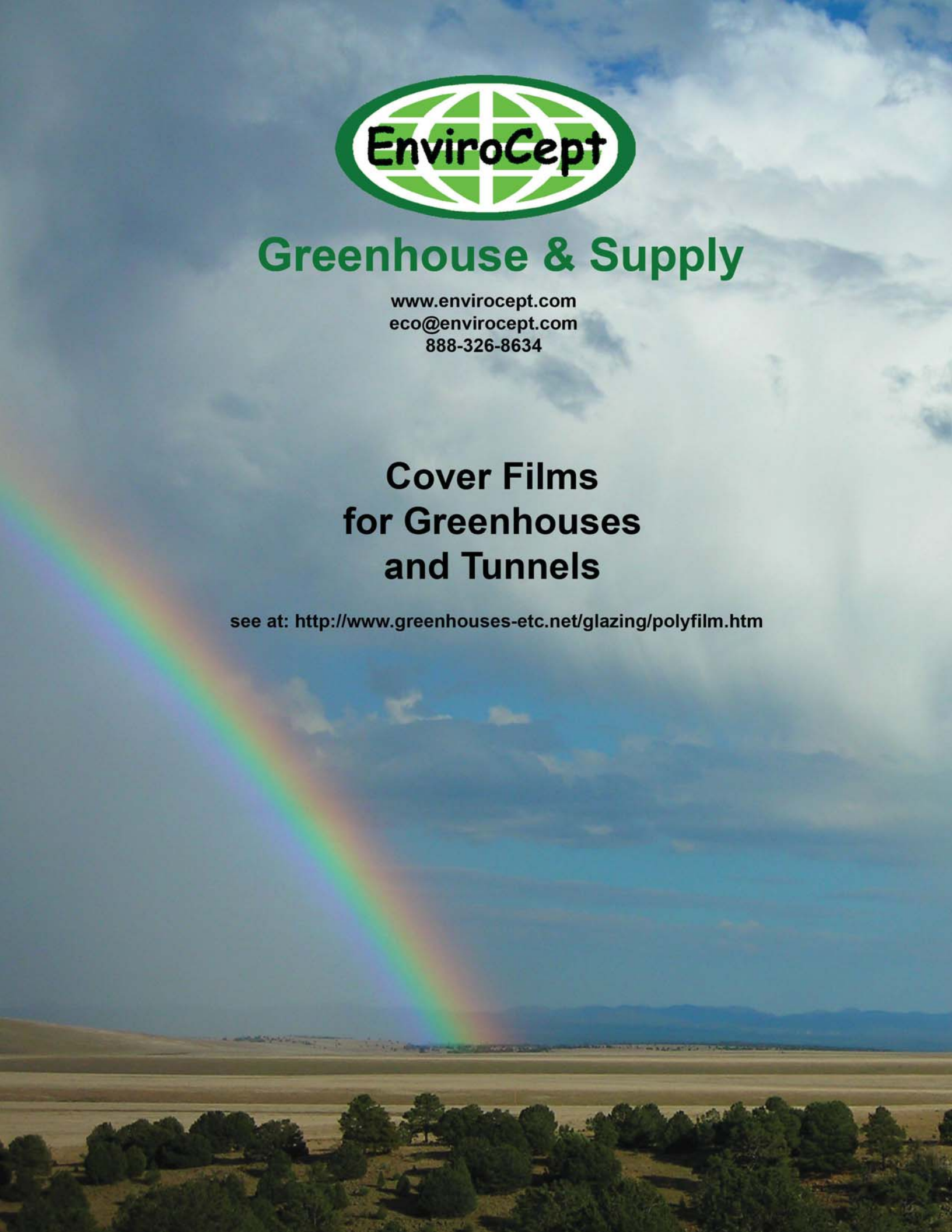



# Greenhouse & Supply

www.envirocept.com
eco@envirocept.com
888-326-8634

# Cover Films for Greenhouses and Tunnels

see at: http://www.greenhouses-etc.net/glazing/polyfilm.htm

# *Introduction*

## SUN SELECTOR™

FVG® America's Sun Selector™ Polyethylene (LDPE) greenhouse films, manufactured by Ginegar Plastic Products, are one of today's most advanced co-extruded triple layer films, offering growers numerous advantages due to their unique mechanical and optical properties.

In today's competitive market, growers must react to increasing market pressures by offering innovative products and variety, achieved by improved growing techniques. Ginegar's agricultural experts work together with growers in Israel and abroad to develop products to meet the needs and demands of the dynamic horticultural industry. With years of experience in the U.S., FVG® America's Sun Selector™ family of films includes a range of products with unique features. FVG® America films meet international ISO 9002 standards.

## FVG® America - Sun Selector™ Family of Films

***Sun Saver™ Clear (IR/AF)***

***Sun Saver™ Diffused****

***Sun Saver™ Red****

***Sun Saver™ Reflective* (Copper)***

***Sun Saver™ Blue****

***Sun Saver™ Plus (FI)****

***Fog-Bloc™ - UVA Stabilized with Anti-Fog***

***3HL™ - 3 year UVA Stabilized Film***

***2HL™ - 2 year UVA Stabilized Film***

***1HL™ - 1 year UVA Stabilized Film***

** Contain IR/AF additives*

# GENERAL DESCRIPTION

**FVG® America's Sun Selector™ Films incorporate unique mechanical, optical and thermal features which give growers effective solutions to a broad range of needs and applications.**

**The triple-layer technology combines the various additives in separate layers to derive maximum benefit and ensure long product life.**

## Mechanical Strength

The use of additives such as EVA and UVA in various layers makes the films extra strong, flexible, and resilient – features that ensure extended life and enhanced efficiency.

The following table presents the physical specifications of Sun Selector™ films.

| Physical properties | | Test method ASTM | Units | Values |
|---|---|---|---|---|
| Tensile strength at Break | MD | D-882 | MPa | 22 |
| | TD | D-882 | MPa | 19 |
| Elongation | MD | D-882 | % | 550 |
| | TD | D-882 | % | 700 |
| Tear resistance (Elmendorf) | MD | D-1922 | g | 800 |
| | TD | D-1922 | g | 1100 |
| Drop impact | F50 | D-1709 | g | 550 |

(All properties are average values of 6 mil Sun-Selector™ film)

## Resistance to Climatic Conditions

Sun Selector™ films successfully withstand climatic conditions throughout the world. These include extreme temperatures ranging from -22°F to 122°F. They are also resistant to severe weather and air pollution.

## Light Transmission

The excellent optical features of Sun Selector™ films allow optimal light transmission. Maximum light transmission in the visible range (PAR) between 0.4 to 0.7 micron is the required range for photosynthesis and various morphogenetic processes.

## Dust-repellence

Sun Selector's™ triple-layer construction results in a smooth film that prevents dust accumulation on the outside. This is an important feature to insure maximum light transmission.

## Easy installation

Polyethylene films are ideal for greenhouses, tunnel passages, and low tunnels. Their light weight and flexibility enables fast, easy installation. Transporting the films is convenient and their use enables savings in construction expenses.

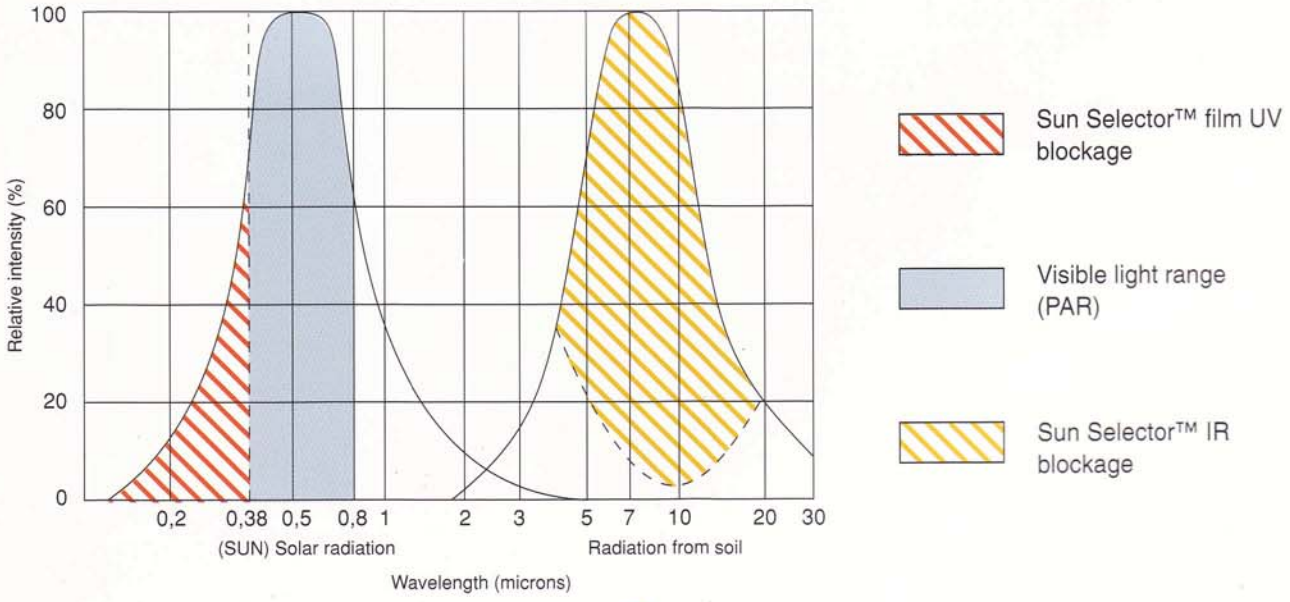
# M A I N F E A T U R E S

## Thermal Effect

IR additives enable films to absorb or reflect infrared radiation in the range of 7 to 15 microns. This is the radiation reflected from the earth to space. Absorption or reflection in this range reduces loss of energy that has been accumulated throughout the day in the greenhouse and prevents heat loss at night. This is an important advantage for farmers especially on cold nights and results in substantial savings in heating expenses. Sun Selector™ films have resulted in a 30% increase in yields as compared with films lacking IR additives.

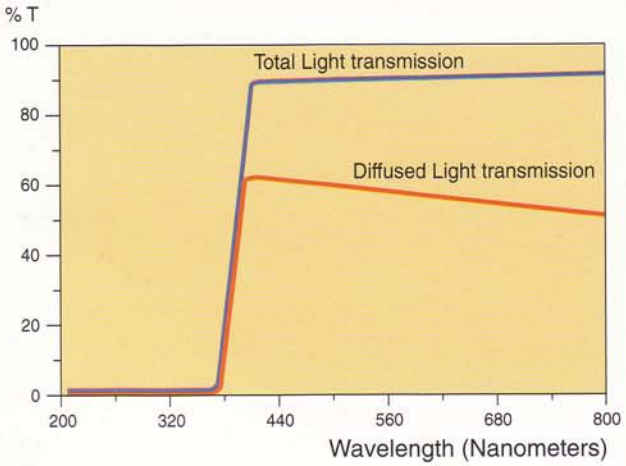
## A.F. (Anti-Fog) Action

Anti Fog improves light transmission and prevents water from accumulating on the film and dripping on the plants. Incidence of disease is thus reduced. Cool drops on the plant foliage lower the temperature of the plant at night and may cause scorching during the day.



## Light Diffusion

Light diffusion additives to the films result in increased photosynthesis efficiency. This feature is especially important for self shading trailing plants, such as tomatoes, cucumbers, squash, pepper, roses and others. Optimal light diffusion does not impair light transmission. The following table presents light diffusion figures for the Sun Saver™ Diffused film.




## Fluorescent Action

The fluorescent additive produces a change in the light composition in the red to far red ratio. This change brings about "sleepy eyes" and enhanced bloom, resulting in substantially increased yield and quality (See Sun Saver™ Red).

## Reflective Action

The reflective additive in the thermal film enables dual purpose usage (See Sun Saver Reflective):

1. Controlled shade and lessened heat stress
2. Thermal screen that stores heat and raises night temperature in the greenhouse (lower heating expenses in winter)

## Fungus Inhibitor (FI)

FI features offer special advantages:

1. Reduces the harmful effects of ultraviolet (UV) radiation on plants.
2. Preserves unique features giving film longer life, even under harsh radiation conditions.
3. Reduces disease occurrence (such as Botrytis).
4. Reduces blackening of red roses.
5. Improved film resistance to chemicals.

These new features are the result of extensive research and development (See Sun Saver™ Plus - FI).

## Warranty

Sun Selector™ films are stabilized against U.V. radiation for three years (according to warranty).

## Technical Specifications

Thickness: 4 - 8 mil
Width: Between 5 - 50 ft.
Film length: Per customer specifications

# PRODUCTS AND APPLICATIONS

*Sun Selector™ films are designed for greenhouse, and tunnel coverage.*

## Sun Saver™ Clear (IR/AF)*

Sun Saver™ Clear has both IR and Anti-Fog additives Thermal films with maximal transparency. Light transmission over 90% - enhances photosynthesis process. Improved mechanical features, adaptable to all climates. Recommended for all types of flowers (except red roses) and all types of greenhouse-grown vegetables.


## Sun Saver™ Red*

Thermal, fluorescent film that changes the composition of visible sunlight (PAR). Upon reaching the plant, this "change" transmits information that boosts its development. The film is recommended for regions having medium or high light intensity. Recommended for: Roses, African Daisy (Gerbera), gypsophila, tarragon, and tomatoes.


## Sun Saver™ Diffused*

Thermal film characterized by high transparency, enabling optimal light diffusion in the greenhouse, does not diminish light transmission that arrives to all parts of the crop. Ideal for regions with high radiation. Provides desirable conditions for growth during periods of intense heat. Ideal for leafy crops and plants that produce excessive shade.
Recommended for: Tomatoes, cucumbers, squash, pepper, roses, and others.


## Sun Saver™ Reflective (Copper)*

These films are dual purpose:
(1) Coverage and shade for greenhouses - decreases the temperatures during day, preserves heat at night. Recommended for regions with strong radiation. Ideal for "shade-loving" vegetation such as house plants.
(2) As a mobile thermal screen that stores heat and saves energy during cold nights and provides shade during radiation hours. Effective for all greenhouse crops, vegetables, flowers.
Copper films are available in 60% or 40% shade levels.


***Contains IR/AF additives**

## Sun Saver™ Blue

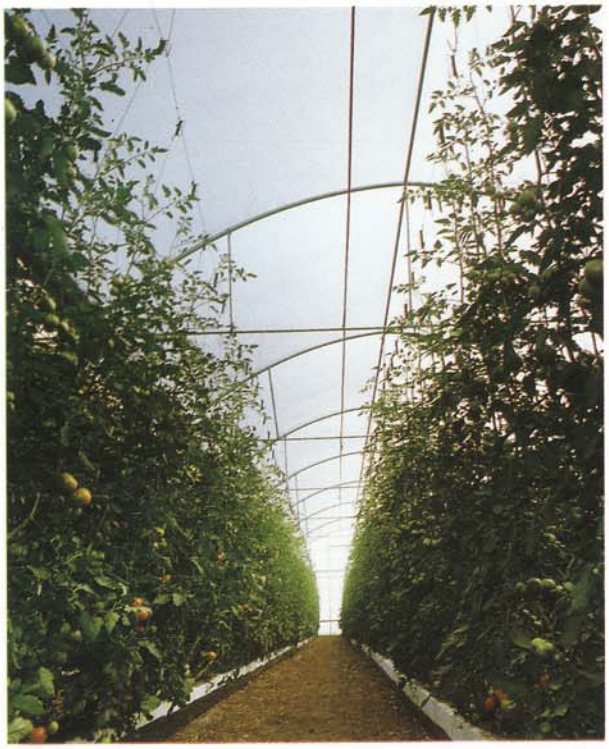
Alters the light composition that penetrates the greenhouse, thus hampering development of fungus and spread of disease, primarily botrytis (gray mold) and Pseudoperonospora Cubensis (downy mildew).

## Sun Saver™ Plus (FI)

PLUS features can be added to all films, and increase the film's effectiveness. They are suitable for greenhouse crops in all regions, and are ideal for plants that are sensitive to Botrytis and similar diseases, and for decreasing blackening of red roses. The blockage of harmful radiation results in stronger, healthier crops and increased yield. Film's resistance to harsh radiation conditions and to chemicals increases the film's life span.

## Fog-Bloc™

U.V.A. stabilized with Anti-Fog additives.



## 3HL™, 2HL™, 1HL™

High-lite Triple-layer films stabilized against U.V. degradation. Maximum transparency. Available in clear and white for use as Shade films. U.V stabilized.

# General Guidelines for Handling Polyethylene Films in Greenhouses

## A General

1. When using Sun Selector™ films, it is imperitive that the installer knows there is an inside and outside to the films. When you are inside the greenhouse, you should be able to read the words "Sun Saver" or "Fog Bloc" correctly. If the words are backwards, the film is upside down and the anti-drip properties will not work properly.
2. Store the rolls of film in a shady spot, on a flat surface, balanced and covered. It is recommended to keep a sample piece of film with manufacturer's identification.

## B Preparation of Greenhouse Structure

1. Paint all metal and wood surfaces touching the poly with latex paint. Never use oil based paint.
2. Use straps at bows to stop waves from forming in the film.
3. Avoid film contact with any PVC plastic or vinyl. Replace any PVC or polycarbonate profiles with aluminum or wood.
4. Smooth the surface of metal and wood parts that come in contact with the films and wrap with polyethylene tape (white or transparent that contains U.V.A.) over all protruding parts.
5. Clean gutters and install drainage pipes.
6. Use only repair tape recommended for poly film.

## C Film Size

**Calculate film sizes as follows:**

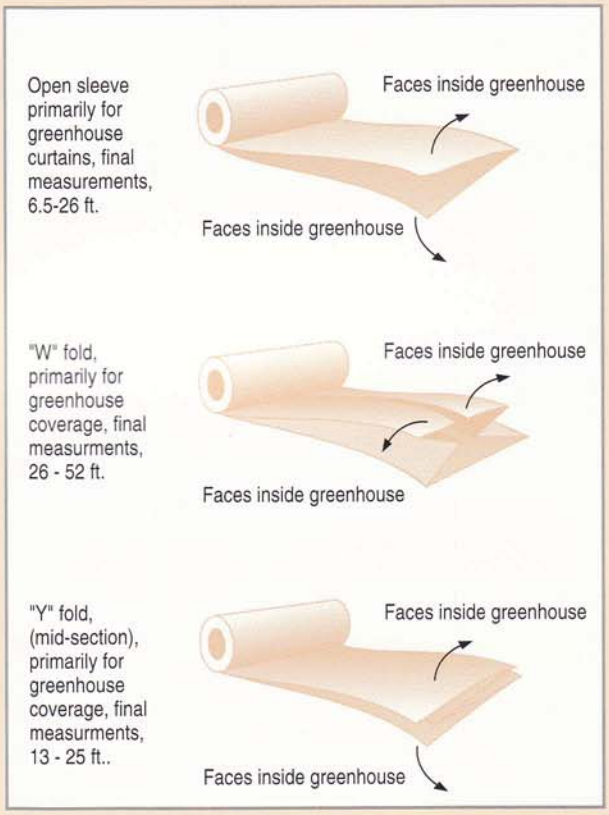
1. For greenhouse spans of up to 25 feet, add an additional 3.3 feet to span size.
2. For greenhouses spans over 25 feet, add an additional 5 feet to span size.
3. For tunnels, calculate an additional 5 feet for openings (for fitting into channels).
4. The length of the film will be approximately 16 feet longer than the greenhouse/tunnel.
5. For curtainwalls calculate the height of the curtainwalls with an additional 20"-30" for supports; length should be the length of the greenhouse.

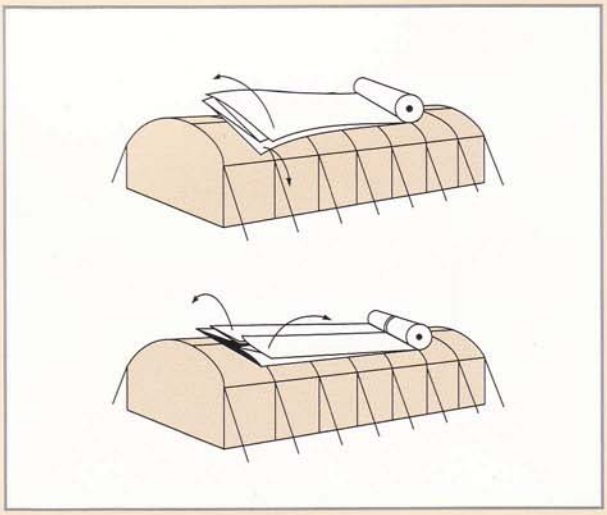
# INSTALLATION

## A Instructions

**Polyethylene films are manufactured in widths of up to 50 feet to suit farmers' individual needs. They have convenient folds that make them easy to transport and install. The various folds are detailed on the back of each roll.**

1. Do not open the polyethylene roll before installation.
2. Install the film as late as possible in the season (at planting time).
3. When installing triple-layer films, make certain that outside of the film is placed on top of the greenhouse, according to folds and installation instructions.
4. For proper placement of the film on the greenhouse it is important to keep the film intact and prevent decay. Suggested method: Place the polyethylene roll on top of the gable while tilting the roll toward the length of the greenhouse. All other methods where the roll is placed on the ground and the film is pulled towards the roof of the greenhouse (from front or side) are not recommended!
5. The film should be installed during early morning hours (cold, without wind), and pulled evenly down the length.
6. Re-stretching is done after the film gets warmer.
7. Both surfaces of poly should be as smooth as possible to enable better water "sheeting".
8. Do not stretch film on hot days as it will contract when cool and may weaken.
9. Installation of the roof and sidewalls should be done at the same time.
10. Static air pressures between the two poly layers should be between 0.2 and 0.4 inches of water on a manometer.
11. Use outside air to inflate poly as it is less humid and less likely to contain chemicals.
12. Purlins with gutters will help remove condensation from film and reduce dripping.
13. Maintain a 3% slope for adequate water run-off.



14. Avoid direct spraying of any chemical on film surface.
15. Install a permanent manometer in each roof. Check manometer often to safeguard against developing tears or to discover a loose lock. Too little air on a windy day can cause exceccive flapping and too much air on a hot day can cause stretching and weakening of the film.

## B After Installation

1. With white acrylic paint stripes, cover all metal and wood parts that come in contact with the film (along the arches, ribs, supports, slats, etc.).
2. It is desirable to stretch polyethylene strips of 7.8" width between the arches (from gutter to gutter). Use only polyethylene strips.
3. Shade nets installed incorrectly that come in contact with the polyethylene film may harm the film.

## C Ongoing Maintenance

1. Holes or tears must be repaired immediately with adhesive tape designed for polyethylene films.
2. When necessary, the films should be stretched, between seasons, and especially after strong winds.
3. In summer it is possible to whitewash the roof to reduce heat intensity. This should be done only with recommended materials for polyethylene films. It is not recommended to whitewash films immediately after laying them. Using adhesive materials makes cleaning the films more difficult.

## D Use of Insecticides

**Sulphur and insecticides containing sulphur or halogens cause damage and erosion to polyethylene films. When using a spray gun, do not wet the film (especially when spraying tall or trailed crops).**

*The above instructions are recommendations only.*