AGRICULTURAL films

UV-resistant for monolayer and coex-films
DUE TO CLIMATE CHANGE, GLOBAL POPULATION GROWTH AND THE LOSS OF AGRICULTURAL LAND, IT IS MORE IMPORTANT THAN EVER TO DEVELOP SOLUTIONS THAT USE THE RESOURCES WE HAVE AS EFFICIENTLY AS POSSIBLE SO THAT WE CAN CONTINUE TO FEED MANKIND.

One such solution is provided by plastic films made predominantly from polyethylene, which have become essential to modern agriculture. Thanks to the excellent protection that they afford against climatic and mechanical effects, not to mention their great practicability, these films offer food producers a wealth of economic benefits that enable them to make optimal use of their resources. They give growers strict control over the amount of light and heat that reach their crops, which not only reduces water loss and improves the health and quality of the plants, but also yields more frequent and abundant harvests while lowering the rate of crop failure. This is why experts predict that the use of agricultural films will increase by between 5% and 6% year-on-year until 2030.
We offer a range of premium-quality masterbatches for agricultural films under the brand name MAXITHEN®. This range includes master batches for providing the films with effective protection against UV and heat damage and reducing heat loss during the night, as well as a number of anti-fogging and anti-dripping solutions for them.

The recommendations we make for greenhouse films, plastic mulch films and plastic row coverings are almost always tailored to meet the specific demands of both the film manufacturer and the user and adapted to suit the local climate.
EXPECTED SERVICE LIFE OF AGRICULTURAL FILMS

ULTRAVIOLET RADIATION DRAMATICALLY ACCELERATES THE PLASTIC DEGRADATION PROCESS which in turn significantly decreases the mechanical strength and elasticity of the film. This „ageing process“ is tested by measuring the elongation at break: The film’s residual elongation at break, at the end of its required lifespan is deemed acceptable if it is at least 50% of the original value. This determines the service life that can be expected of the tested film at a specific level of solar radiation.

The intensity of the sun’s rays varies around the world from climate zone to climate zone. This means that the key to deriving maximum functionality from films and enabling them to reach the service life required of them is adjusting the UV stabilization to suit each geographic region.

WORLD MAP OF GLOBAL IRRADATION

This map shows the amount of solar radiation that falls on different parts of the world each year. The amount of solar radiation energy yielded over each area of the Earth’s surface is measured in Kilolangley (kLY) per m².

Surplus thermal energy is another factor that accelerates the oxidative degradation of films and thereby prematurely depletes their strength. This is why it is a good idea to provide them with batches that combine UV stabilizers with antioxidants (UVAO) in certain applications.
THE ACTIVE AGENTS USED – DEPENDING ON THE SPECIFIC NEEDS – ARE EITHER HALS-BASED (HINDERED AMINE LIGHT STABILIZERS) UV STABILIZERS WITH DIFFERENT LEVELS OF EFFICIENCY OR NICKEL (NI) QUENCHER SYSTEMS. THE FOLLOWING PARAMETERS MUST BE TAKEN INTO CONSIDERATION WHEN DECIDING WHICH TO CHOOSE: THE GEOGRAPHICAL AREA IN WHICH THE STABILIZER WILL BE USED, THE SERVICE LIFE REQUIRED OF IT, WHETHER OR NOT AGRICULTURAL CHEMICALS WILL BE EMPLOYED, AND THE STRENGTH AND STRUCTURE OF THE FILM (MONOLAYER OR MULTILAYER/COEX).

Nickel quenchers provide an efficient and cost-effective means of stabilizing UV levels whilst also offering high resistance to sulphurous agrochemicals. HALS compounds have also become a popular solution around the world. HALS denotes a family of organic compounds, the chemical composition of which determines their suitability for the specific type of polymer that needs to be protected, how effective this protection will be, their migration behaviour and their resistance to agrochemicals. The latest generation of NOR HALS types in particular offer not only an especially high level of protection against UV radiation, but also high resistance to agrochemicals containing sulphur and chlorine.

Our considerable experience in this field and comprehensive knowledge of which stabilizer to use where, taking your budget into account, can help you to achieve your goals.
This graph shows the pesticide resistance of an LDPE film (200 µm thick) with different types of UV stabilizer. Tests were conducted on the parts of the film that were in contact with a wooden or galvanised iron frame and any areas that were not directly exposed. Metam sodium (Na) was applied twice a year and permethrin (CI) was applied once a year. Our product MAXITHEN® HP7AA1220UV (fourth generation of NOR HALS) exhibits a significantly elevated level of pesticide resistance. After 30 months of use (UV radiation of approx. 140 kL/Year = approx. 350 kL in total), this film’s residual elongation at break is 50%.

**Resistance to Sulphur**

Influence of sulphur on service life span
IR BARRIERS in the film prevent greenhouses and polytunnels from cooling down overnight and protect them from excessive solar radiation during the day. They are made from special minerals that reflect the thermal radiation (NIR spectrum) that falls onto the wall of the film back into the greenhouse. This can decrease heat loss by up to 75%. Customers can choose between either pure IR masterbatches or combination batches consisting of UV stabilizers and antioxidants – we will always pay extremely close attention to potential cross-reactions when selecting the active agent(s).

ANTI-FOGGING ADDITIVES, when applied correctly use the condensation that precipitates on the inside of the greenhouse film to create a transparent film of water and prevent water droplets from forming. Water that drips off the leaves of the plants can focus the sunlight streaming in and acts as a collecting lens, which increases the risk of the plants growing under the film being burned and sustaining damage. We use anti-fogging agents made from organic compounds that collect on the surface of the film, where they form a hydrophilic layer that exerts minimal surface tension. To increase the efficiency of this effect as much as possible, we recommend using a three-layer coex film with the anti-fogging agent applied to the inside layer and the middle layer only.

We are happy to recommend specific products to suit different applications.
FOR COMPREHENSIVE STABILIZING OF AGRICULTURAL FILMS, FOLLOWING PRODUCTS OF OUR ADDITIVE MASTERBATCH RANGE ARE RECOMMENDED:

**MAXITHEN® HP79141/168UVAO**
Ni-Quencher/UVA/AO  
“1st Generation”  
Greenish colour, good sulphur resistance, for greenhouse films.

**MAXITHEN® HP72630UVAO**
HALS/UVA/AO  
“2nd Generation”  
Transparent, low agrochemical resistance, for cultivations having low or no agrochemical use. For greenhouse films 150–200µm.

**MAXITHEN® HP792850UVAO**
HALS/AO  
“2nd Generation Plus”  
Transparent, improved chemical resistance, for greenhouse films 150–200µm.

**MAXITHEN® HP72910UVAO**
HALS/AO  
“3rd Generation”  
Whitish diffused, outstanding chemical resistance, enables earlier harvests, for greenhouse films 150–200µm.

**MAXITHEN® HP790470AF**
NOR HALS/UVA  
“4th Generation”  
Transparent, best available resistance to high levels of agrochemicals, for greenhouse films 150–200+µm with severe pesticide use.

**MAXITHEN® HP7AA3650UVAOIR**
Ni-Quencher/UVA/AO/Ir  
“1st Generation”  
Greenish colour, good sulphur resistance, combination product with Ir Barrier, for thermic greenhouse films 150–200µm.

**MAXITHEN® HP7AA3640UVAOIR**
HALS/UVA/AO/Ir  
“2nd Generation”  
Transparent, low agrochemical resistance, for cultivations using low or no agrochemical use. For thermic greenhouse films 150–200µm.

**MAXITHEN® HP77AA3630UVAOIR**
HALS/AO/Ir  
“3rd Generation”  
Whitish diffused, outstanding chemical resistance, enables earlier harvests, for thermic greenhouse films 150–200µm.

**MAXITHEN® HP7AA2600UV**
HALS/NOR/UVA  
“3rd Generation Plus”  
Transparent, superior agrochemical resistance, typical application greenhouse films 150–200µm.

**MAXITHEN® HP7AA0410IR**
IR Barrier Masterbatch  
for transparent films, enables IR effectiveness to thermic greenhouse films.

Technical Data © GABRIEL-CHEMIE Gesellschaft m. b. H., AUSTRIA, www.gabriel-chemie.com
BUSINESS UNITS OF GABRIEL-CHEMIE GROUP:

- Building & Agriculture
- Home & Lifestyle
- Packaging for Industrial & Consumer Goods
- Cosmetics Packaging
- Food & Beverage Packaging
- Medical

GABRIEL-CHEMIE Gesellschaft m. b. H.
Industriestraße 1
2352 Gumpoldskirchen
Austria
Tel. +43 2252 636 30 0
Fax +43 2252 627 25 0
info@gabriel-chemie.com

WWW.GABRIEL-CHEMIE.COM