



GABRIEL-CHEMIE
GROUP

For monolayer and coex-films

UV resistant

Traceable through Taggant Technology

AGRICULTURAL FILMS



ADDITIVES *for agricultural 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 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 masterbatches for providing the films with effective protection against UV and heat damage, the reduction of heat loss during the night as well as an effective anti-fog solution.

Recommendations: A tailor-made solution meets the specific demands of both the film manufacturer and the user with the benefit to suit the local climate.



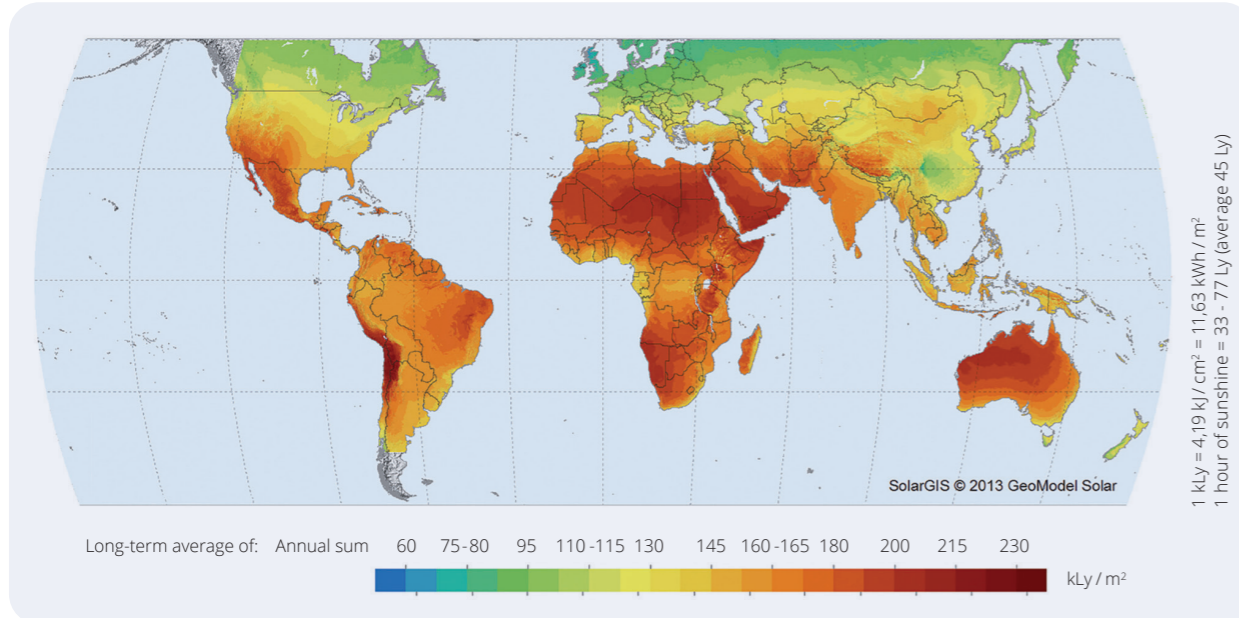
EXPECTED SERVICE LIFE

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 irradiation



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 Kilolanglely (kLy) per m². Surplus thermal energy is another factor that accelerates the oxidative degradation of films and thereby prematurely depletes their strength. Therefore, we recommend combining UV stabilizers with antioxidants (UVAO) in certain applications.



UV STABILIZERS

The active agents used – depending on the specific needs – are either HALS based UV stabilizers (Hindered Amine Light Stabilizers) with different levels of efficiency or further used 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, regardless of whether agricultural chemicals will be employed, and the film thickness 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 at which product as well as taking your requirements into account will help you to achieve your goals.



GREENHOUSE films

UV STABILIZERS

MAXITHEN® HP72630UVAO: based on standard HALS-stabilizer in combination with UV-Absorber and Antioxidant. It is clear transparent, without colouring characteristic to the film. Recommended being used for 1 year / 2 season film where no or very low agrochemical resistance is required.

MAXITHEN® HP7AB2010UVAO: contains a high performance light stabilizer system in combination with UV-absorber and antioxidant additives, providing a long-lasting UV and thermal stabilization effect (up to 3 years) and a high resistance to agrochemicals up to 2000ppm Sulphur.

MAXITHEN® HP7AB2020UVAO: based on newest generation NOR HALS technology with UV- absorber and antioxidant, with long-term thermal stabilization effect, for long-life films (2–3 years) of very high chemical resistance requirement for up to 3000 ppm Sulphur on the film surface.

MAXITHEN® HP79141/168UVAO: based on Nickel Quencher, UV-Absorber and Anti-oxidant with its typical greenish colour and good sulphur resistance. Recommended for greenhouse film with a service life of 2 years (up to 33 months / 2 summers), depending on the film thickness, application area and yearly sun radiation energy. Well known and established in more severe climate zones, this batch provides a good price/performance ratio to the greenhouse film for typically grown plants of this region – e.g. tomatoes, cucumbers, etc.



INFRARED (IR) MASTERBATCH for thermic greenhouse films

The use of IR masterbatch in greenhouse films helps to reduce heat losses during the night, when temperatures decrease. At night, the warm plants, soil and components within the greenhouse lose energy by transmission of long wave radiation (infrared) to the cold sky above. The rate of this loss depends, not only on the temperature of the plants, and the atmospheric conditions (clouds, carbon dioxide, and ozone content), but also on the properties of the greenhouse film cover material.

The advantages of so-called “thermic films” are:

- Protection from frost and low temperature
- Reduced energy consumption for heating
- Higher crop yield and earlier harvesting
- Better quality of the crops.

MAXITHEN® HP7AA0410IR: contains special grade of mineral filler with high purity that does not affect film clarity, to generate IR-barrier properties helping to maintain higher night temperatures inside the greenhouse.

ANTI-FOG (AF)

Fogging in plastic films refers to condensation of water vapour on the surface in the form of small discrete droplets, which results from differences in surface tension between the water droplet and the polymer surface. The use of antifogging additives in agricultural films are required to prevent crop damage due to drop formation, light scattering or dripping.

The anti-fog additive is incorporated into the polymer matrix during the extrusion process. Upon extrusion the additive migrates to the surface of the polymer where the additive is increasing the surface tension on the polymer so that the water droplet is spread into a continuous layer of water, which is transparent.

By using anti-fog additives you will benefit of an improved light transmission of greenhouse films, resulting in higher plant and crop growth rates, earlier crop maturity and it will also reduce burning of plants and crop spoilage by reducing constant water dripping.

In case of monolayer agricultural films, the anti-fogging effect has a duration between 6–12 months. A longer lasting anti-fogging effect can be achieved through multilayer films.

MAXITHEN® HP790470AF: Antifog masterbatch that contains a surface-active additive, which prevents droplet formation in the internal surface of greenhouse films. The durability of the antifog effect applies up to 1½ years, depending on used polymer types and film thickness.

LIGHT DIFFUSER

The use of light diffuser additives in greenhouse films has a positive effect on plant growth. Light diffusion reduces shadows, ensures more uniform distribution of light in the greenhouse so that it reaches even the lower parts of the plants, prevents burning and offers a moderate cooling effect. The choice of the most appropriate level of diffusion depends on the climate of the area, the crop, and the seasonality.

MAXITHEN® HP7AA4550MOD: Mineral filler based light diffuser masterbatch for more homogenous light distribution to eliminate shadow inside the greenhouse. This helps to improve the growth of plants.



SILAGE & MULCH *films*

WHY SILAGE FILM?

Modern farming is driving the need for higher yields in milk production, improved quality of feed for livestock, healthy husbandry conditions and increasing independence from weather conditions. Silage feed offers an effective solution to these requirements and has therefore become an integral part of farm animal nutrition.

Production of silage feed in multilayer stretch wrap film – bale silage – or sliced in long Polyethylene tubes offers farmers a reliable and easy to handle solution. The most important features of silage films are its excellent insulation properties (barrier characteristics against air and water) as well as its resistance to sunlight.

For transforming grass, crops and other organic components into high quality fermented feed stuff by means of an anaerobic biologic-organic process, it is essential to use the highest quality top-grade covering/wrapping film.



DECISIVE FACTORS *for good silage films*

- Type and suitability of the applied polyethylene grade for the actual application
- Constant film thickness and homogenous distribution of the constituent components
- Light fastness / UV stabilization according to the geographic region of deployment and required / specified film service life span
- Resistance to environmental factors – e.g. agrochemicals, fertilizers, pesticides, liquid manure
- Good tackiness of the overlapping film layers after stretch wrapping
- High puncture resistance and tear strength
- Compatibility of white / colour pigments with the light stabilizer and other components of film recipe
- Layer design and specific dosage per layer of recipe components (colour, functional additives) in the case of multilayer coextrusion film



UV STABILIZERS *for silage films*

MAXITHEN® HP72160UV: based on a standard HALS system, for all kind of silage and mulch films (wrap, hose, covering), where no or very low agrochemical resistance is required.

MAXITHEN® HP792850UVAO: based on medium chemical resistant HALS system combined with Antioxidant, for films where medium agrochemical resistance is required. Suitable for all kind of silage and mulch films.

TACKIFIER MASTERBATCH

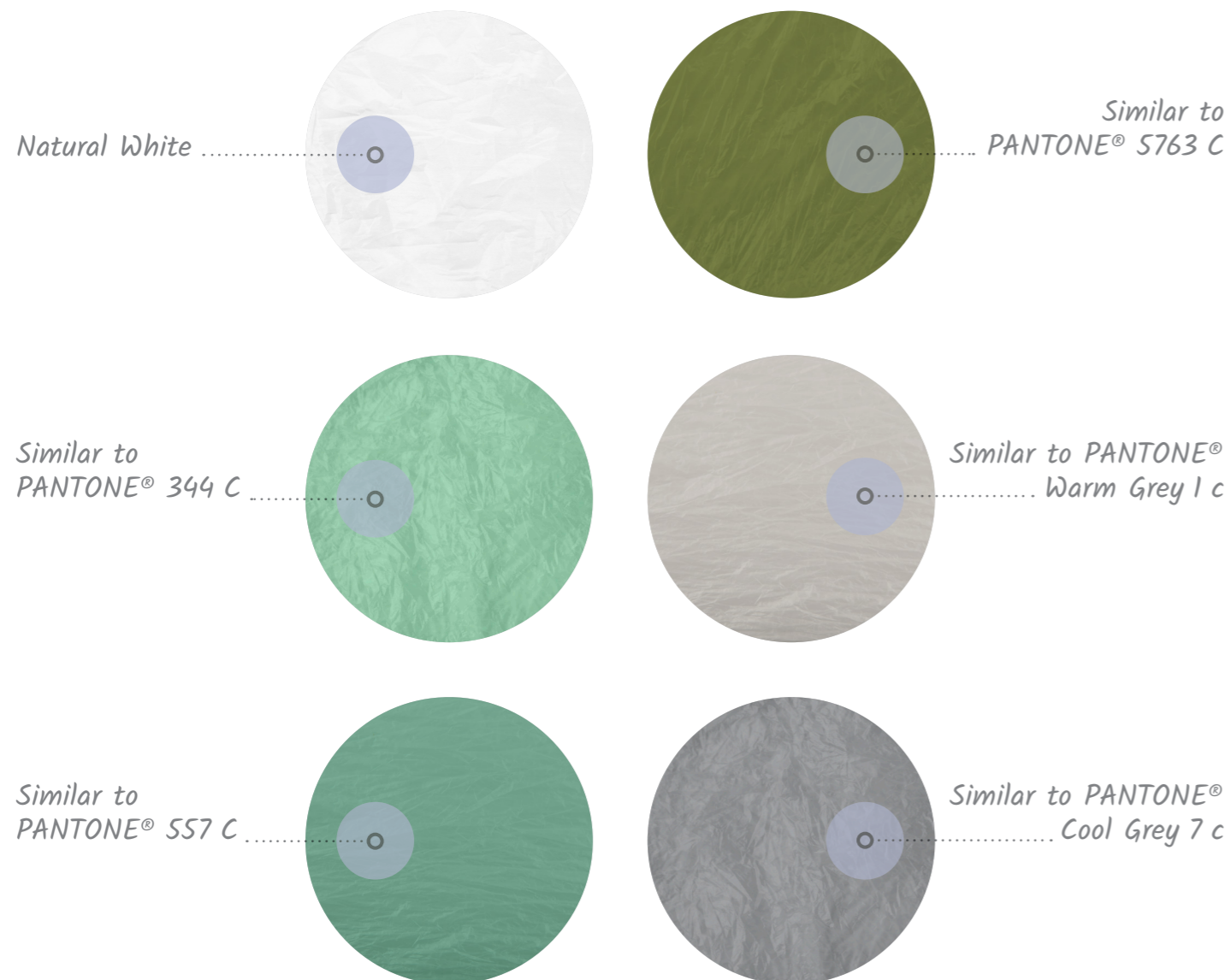
MAXITHEN® HP790240TACK: based on Polyisobutylene (PIB), used as a tackifier additive in granular form, for the production of stretch silage films to increase cling properties to the film.



COLOURS & COLOUR/UV combination masterbatches for silage films

For the colouration of silage films, we elaborate tailor-made masterbatches with high quality pigment dispersion, suitable to be used for very thin films. The colouration and light stabilization we select in cooperation with the customer, according to the desired lifespan expectation, film thickness, and required opacity according to the geographical region of use.

For specification, please contact our Technical Support Team. In this brochure illustrated colours are commonly used ones in silage wrap films and should give only some ideas. Further colour or combination masterbatches can be developed on request.



MULCH FILM

Mulch films are laid on the soil to retain moisture levels in the soil for proper growth of plants. They are used to modify soil temperature, limit weed growth, prevent moisture loss, and improve crop yield and quality. Because of their exposure to high solar irradiation, mulch films require proper light and thermal stabilizers with intermediate chemical resistance. On the market you can find different types of mulch films. Beside transparent and black films also black/white, black/silver and other combinations are available.

BLACK & WHITE

MAXILOOP® NIR-Black: based on carbon black free pigment, for improved recyclability of black films by NIR detecting technology, highly compatible with HALS UV-stabilizers.

MAXITHEN® HP99611 Black: contains 40% UV protection Carbon Black pigment suitable for outdoor applications and in combination with HALS UV-stabilizers.

MAXITHEN® HP1139/60 and /70 White: based on 60 or 70% weather resistant titanium dioxide pigment, suitable to be used for outdoor application and in combination with HALS UV stabilizers for mulch films.

For detailed information regarding its use in very thin layers, our professional and competent Technical Support Team will consult you further.

For silage film colouration generally and Black and White master-batch we elaborate tailor-made fine film masterbatches with the highest quality pigment dispersion according to the requirements (film thickness, opacity). For specification, please contact our Technical Support Team.

UV STABILIZERS for mulch films

MAXITHEN® HP72160UV: based on a standard HALS system, for all kind of silage films (wrap, hose, covering), where no or very low agrochemical resistance is required.

MAXITHEN® HP792850UVAO: based on medium chemical resistant HALS system combined with Antioxidant, for films where medium agrochemical resistance is required.

TAGGANT TECHNOLOGY

"TagTec"

"Imagine your film can talk to you"

It is not just a simple slogan, but an evolutionary part of the "Industry 4.0" idea. This innovative technology developed by Gabriel-Chemie and partners offers to the film producer a huge number of control functionalities for distinct identification of final products and their production process – dosage control of additives, regularity of wall thickness, immediate online correction if the deviation from set parameters is measured, further doubtless and clear identification of origin, invisible labelling e.g. with complete production data, lot no., etc.

All this by the simple addition of a masterbatch and installation of few sensors – possible either in new or also in already existing production lines.

TagTec can be combined on request already by us with all our masterbatches or separately added as a single batch by our customer on-site of production of the final film. Since TagTec is always an individual formulation, an agreement with our customer is a basic prerequisite, according to his intended purposes/level of functionalities. Please contact us for more details about this very sophisticated technology and for first information visit our website:

www.gabriel-chemie.com/en/TagTec





BRINGING LIFE *to plastics*

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GABRIEL-CHEMIE Gesellschaft m. b. H.
Industriestraße 1, 2352 Gumpoldskirchen, AUSTRIA

WWW.GABRIEL-CHEMIE.COM