K R I T I L E N® masterbatches

ADDITIVES

TECHNICAL INFORMATION

Kritilen® additive masterbatches are used as an easy and economic way to incorporate to plastic products special additives that facilitate processing or impart to the products various useful properties. They contain additives or combinations of additives of proven value, at concentration levels that suite each formulation, additive properties and final product or process requirements, perfectly dispersed in an appropriate carrier resin.

PRODUCTS & APPLICATIONS

a) Slip masterbatches

They are used to modify the coefficient of friction of plastic films. The addition level of slip masterbatches depends on film type, thickness and the required slip effect. The coefficient of friction rapidly decreases during the first day after extrusion and levels out to a constant value after 2-3 days. Erucamide is more stable so it should be preferred for processing temperatures above 220°C (HDPE, PP, metallocenes) or if the film has to be stored for a long-time in hot climates. Effectiveness of slip agents is enhanced when in combination with anti-blocking additives. Maximum storage time is 6 months. SLPS7720 can be used for PS films, while SL PT6100 and silicone based masterbatches such as KRITILEN WE PP9120 provide reduced coefficient of friction to PET films.

b) Anti-block masterbatches

They are used to prevent blocking of plastic films.
- AB 62 offers excellent anti-blocking effect without affecting film clarity.
- AB 72 and AB75 also offer good anti-block properties without affecting transparency.
- AB 40 is an economic solution for relatively thick films when superior clarity is not critical.
- PT AB6105 and PT AB612 provide anti-block properties to PET articles giving at the same time better mold release behavior.

c) Antioxidant masterbatches

AO 10 and AO 203 are used at 1-2 % addition when an improvement of the heat and processing stability of polyolefin products is needed, during shut-downs at up to 5 % addition, and when high amounts of recycled material is used, at 1-3 %. AO 12 contains a very effective metal deactivator based on PE carrier and it is used for long term heat stabilization for plastic articles that come in contact with copper or copper alloys. (Wire insulation or metal/plastic composites). AO 108 contains a new generation antioxidant which provides minimum color contribution, excellent compatibility with HALS and UVAs and low volatility.

d) *PA masterbatch*

At an addition rate of 1-2 %, PA 90 and PA 95 eliminate surface defects (fish-eyes, shark skin, orange peals etc.), reduce power consumption and help increasing the output while reducing plate-out on the die-surface. PA 90 and PA 95 are particularly useful for LLDPE reach blends, metallocene & HDPE films. Preconditioning of the die is necessary (please consult us). PA 91 and PA 96 are based on a new generation fluoro elastomer; due to higher efficiency they can be used at lower concentrations in LL/mLL or HDPE films.

e) *Purging masterbatch*

CL 530 is recommended for easy cleaning of plastics processing equipment.

f) *Desiccant masterbatch*

DC 500, DC 501 and DC 451 are used to absorb humidity present in plastic materials. They are particularly useful when processing recycled materials. Please consult us if any other additives are used in the product, to check possible side effects.

g) *Antistatic masterbatches*

They are used to dissipate static electricity from the surface of plastic products, thus facilitating the production and conversion process and/or reducing dust accumulation.
- AT 5 is recommended for long term antistatic performance and is mostly suitable for HDPE films and PE or PP injection and blow-moulding.
- AT 11 is recommended for fast antistatic effect during processing and short- term performance (typically 1-2 months), for polyolefin film extrusion and molded articles.
- AT 12 combines both a fast effect and long-term antistatic performance, which is enhanced by a synergistic action of the additives contained.
- AT 1214 also contains a fast effect and long-term antistatic agent combined with an anti-blocking agent.
- AT 55 contains an amine free antistatic agent which presents high effectiveness at low concentrations, does not affect the color or clarity of the polymer and has FDA approval. It is mainly used for HDPE films and PP injection and blow molding articles.
- AT PS711 provides a long term antistatic effect to GP & HI polystyrene as well as to styrenic copolymers (such as ABS).
- AT PS726 is the preferred antistatic agent for polystyrene and styrenic copolymers. Due to the fact that at required addition levels there is an effect on transparency, it is mostly recommended for opaque articles.
-AT PP912 is recommended for long term antistatic performance and is mostly suitable for PP injection and blow-molding .

Notes :
1) The type of polymer as well as the presence of slip or other additives may influence the antistatic behavior.
2) Maximum storage time for AT masterbatches is 6 months but they should preferably be consumed within 3 months.

h) *Clarifying – nucleating masterbatches*

NC 14 contains a highly effective clarifier for homopolymer or random PP copolymer products. This additive acts as a nucleating agent, by creating a large number of small size spherulites (<1 micron) during the cooling of the polypropylene melt, resulting to a dramatic improvement of the clarity of transparent PP articles. Its use also enhances stiffness and shortens cycle times during the molding process. Processing temperature should be in the range of 240°-260°, the optimum being 255°C
NC 12 and NC13 contain new technology highly effective nucleating agents for PP, offering increased transparency, resin throughput and enhanced mechanical properties. Normal processing temperatures of 220-240°C can be used.

i) *AF for food packaging*

This masterbatch is used to eliminate water droplets from the internal surface of food packaging, particularly deep freeze films, at an addition rate of 4-6%.

j) *Antimicrobial masterbatches*

- AM PS7100 (for PS products) & AM PP9100 (for PP products) and AM 5100 (for PE products) contain a long lasting broad spectrum antimicrobial agent against gram-positive and gram-negative bacteria as well as mold and yeasts. This antimicrobial is of high purity and conforms to US Pharmacopeia.
- AM PS7520 (for PS products) & AM PP9520 (for PP products) contain a silver based antimicrobial agent which is very effective for a broad spectrum of microorganisms such as bacteria, fungi and algae.

k) *Flame retardant masterbatches*

- FR 300 is designed for PP products, particularly stadium seats and other furniture. It is based on a combination of a bromine compound and antimony trioxide (Sb2O3). Recommended addition rate is 8-12 % for V2 classification (UL94) and 25-30 % for V0 classification.
- FR 400 contains a synergistic combination of an organic bromine complex and antimony trioxide in LDPE base. The product is intended for polyethylene extrusion products (e.g. films, pipes) provided that the processing temperature does not exceed 210°C. Recommended addition rates for LDPE is 6-8 % while for HDPE it is 8-10 %, to achieve DIN4102 B1.
- FR210/FR2102 are mainly intended for polyolefin fibers, containing a special halogen free flame retardant which combines flame retardancy with UV and thermal stabilization. Recommended addition rate to comply with NFPA 701 is 2-3 % in PP fibers and 5 % in PP and LDPE films (50 μm).
- FR 500/FR720 contain a selected bromine compound in PS carrier. The main application is expanded PS sheets, at a 4-5 % addition.
- FR 505 contain an organic bromine complex in LLDPE base without the addition of antimony trioxide and therefore can be used for PE and PP extrusion and injection moulding products without affecting transparency. Recommended addition rate to comply with DIN 4102 B1 is 5-7%.

l) *Anti-slip masterbatch*

KRITILEN ANTISLIP 570 provides a “rough” surface when used in polyolefin films/sacks, which results to anti-slip properties.

m) *Optical brightener masterbatches*

Optical brighteners absorb light in the UV-A range and re-emit it as blue light. This feature improves the appearance of the plastics products by masking the inherent “yellowish” color and giving to them a “clean” bluish shade.

KRITILEN OB 10, OB PS712 and OB PP3 can be used at 1-3% addition rates for PE, PS and PP products respectively.

n) *Anti-sticking masterbatch*

AD 16 can be used in shrink films in order to provide antitackle properties and reduce dust accumulation. It is also used in HDPE tapes in order to facilitate weaving. Recommended addition is 0.5-2 %.

KRITILEN®	CARRIER RESIN	ADDITIVES (%)	ADDITIVE TYPES	RECOMMENDED ADDITION (%)	FOOD APPROVAL
SLIP 60	PE	6	Combination of erucamide and oleamide slip agents	0,5-2	Yes
SLIP 66	PE	5	Oleamide slip agent	0,5-2	Yes
SLIP 67	PE	5	Erucamide slip agent	0,5-2	Yes
SLIP PP960	PPH	6	Combination of erucamide and oleamide slip agents	0,5-2	Yes
SLIP PP967	PPH	5	Erucamide slip agent	0,5-2	Yes
SLIP PS7720	PS GP	20	Slip Agent	2-2.5	Yes
WE PP 9120	PPH	15	Organomodified Siloxane	1-2	Yes
SL/PT 6100	PET	10	High temperature slip agent	2-3	Yes
SLIP/AB 61	PE	25	Combination of inorganic anti-blocking additive & oleamide	1-2	Yes
SLIP/AB 63	PE	15	Combination of synthetic silica and erucamide slip	1-2	Yes
SLIP/AB 69	PE	20	Combination of synthetic silica and erucamide slip	1-2	Yes

KRITILEN®	CARRIER RESIN	ADDITIVES (%)	ADDITIVE TYPES	RECOMMENDED ADDITION (%)	FOOD APPROVAL
SLIP/AB 70	PE	50	Combination of natural silica, erucamide & oleamide	1-2	Yes
SLIP/AB 674	PE	45	Combination of inorganic anti-blocking agent and erucamide	1-2	Yes
SLIP/AB 70	PE	50	Combination of natural silica, erucamide & oleamide	1-2	Yes
AB 40	PE	40	Inorganic anti-blocking additive	1-2	Yes
AB 62	PE	15	Synthetic silica	1-2	Yes
AB 72	PE	20	Natural silica	2-3	Yes
AB 75	PE	50	Natural silica	1-2	Yes
PT AB6105	PET	5	Silicon based additive	0,5-2	Yes
PT AB612	PET	10	Synthetic silica	0,5-2	Yes
AO 10	PE	10	Combination of heat and processing stabilizers	1-5	Yes
AO 108	PE	4	New generation antioxidant and polymer processing aid	1-5	Yes
AO 12	PE	10	Metal Deactivator	1-3	No
AO 203	PE	5	Combination of heat and processing stabilizers	2-5	Yes
PA 90	PE	2	Polymer processing aid	1-2	Yes
PA 91	PE	2	New generation polymer processing aid	1-2	Yes
PA 95	PE	5	Polymer processing aid	0.5-1	Yes
PA 96	PE	5	New generation polymer processing aid	0.5-1	Yes
CL 530	PE	55	Combination of inorganic and organic purging agents	10-15	No
DC 500	PE	50	Inorganic desiccant	0,5-2	No
DC 451	PE	70	Inorganic desiccant	0,5-2	No
DC 501	PE	60	Inorganic desiccant	0.5-2	No

KRITILEN®	CARRIER RESIN	ADDITIVES (%)	ADDITIVE TYPES	RECOMMENDED ADDITION (%)	FOOD APPROVAL
ANTISLIP 570	PE	70	Coarse particle size inorganic additive	5-10	Yes
AT 5	PE	5	Slow migration antistatic agent	2-4	Yes (up to 3%)
AT 55	PE	5	Amine free antistatic agent	2-5	Yes
AT 11	PE	10	Fast migration antistatic agent	1-2	Yes
AT 12	PE	10	Combination of fast and slow action antistatic agents	1-2	Yes (up to 3 %)
AT 1214	PE	30	Combination of fast / slow action antistatic agents with inorganic antiblocking agent	1-2	Yes (up to 3 %)
AT PS711	PS-GP	10	Slow migration antistatic agent	3-5	Yes
AT PS726	PS-GP	20	Selected antistatic agent	3-5	Yes
AT PP912	PPH	4	Slow migration antistatic agent	2-4	Yes (up to 3 %)
NC 14	PP	10	Nucleating agent	1,5-2	Yes
NC 12	PP	4	New generation nucleator	1-2	Yes
NC 13	PP	4	Heterophasic nucleator	1-2	Yes
AF 76	PE	20	Selected anti-dripping agent for food packaging	5-7,5	Yes
AM 5100	PE	10	Antimicrobial & antibacterial agent	2-4	Yes
AM PS7100	PS-GP	10	Antimicrobial & antibacterial agent	2-4	Yes
AM PP9100	PPH	10	Antimicrobial & antibacterial agent	2-4	Yes
AM PS7520	PS-GP	20	Silver based antimicrobial agent	5-10	Yes
AM PP9520	PPH	20	Silver based antimicrobial agent	5-10	Yes

KRITILEN®	CARRIER RESIN	ADDITIVES (%)	ADDITIVE TYPES	RECOMMENDED ADDITION (%)	FOOD APPROVAL
FR 300	PPH	33	Combination of bromine compound & antimony trioxide	25-30 UL94 V0	No
FR 400	PE	72	Combination of bromine compound & antimony trioxide	6-8 DIN 4102B1	No
FR 500	PS-GP	50	Bromine compound	4-5 DIN 4102 B2	No
FR 720	PS-GP	75	Bromine compound	2.5-3 DIN 4102 B2	No
FR 505	PE	50	Bromine compound	5-7 DIN 4102B2	No
AD 16	PE	10	Lubricant	0.5-2	Yes
FR 210	PE	20	Selected halogen free flame retardant	2-5 NFPA 701	No
FR 2102	PE	10	Selected halogen free flame retardant	4-10 NFPA 701	No
OB 10	PE	10	Optical brightener	1-3	Yes
OB PS712	PS-GP	10	Optical brightener	1-3	Yes
OB PP3	PPH	3	Optical brightener	1-3	Yes

Other additive masterbatches can be produced upon request, with different types/content of additives or with a different polymer carrier or combinations of additives, UV-stabilizers and colors for specific applications.

SPECIAL ADDITIVES FOR AGRICULTURAL FILMS

These additives are used in agricultural films (for greenhouses, low-tunnels, mulching) to provide them special features, such as thermic, anti-drip, anti-dust, anti-virus and photo selective properties.

KRITILEN	CARRIER RESIN	ADDITIVES (%)	ADDITIVE TYPES	RECOMMENDED ADDITION (%)
UV 23	PE	15	Special UV-absorber	2-3
IR 550	PE	50	Inorganic Infra-Red absorber	5-15
HT 555	PE	50	Special Infra-Red absorber	2-4
AF 61	PE	25	Anti-dripping agent	6-12
AF 62	PE	25	Anti- dripping agent	6-12
AS 40	EVA	40	Anti-sticking & anti-dust agent	1-4
DIFFUSER 557	PE	50	Special inorganic diffuser	5-10
BROWN 70964	PE		Pigments and Infra-Red absorber	20 (*)
BROWN 70869	PE		Pigments	20 (*)
YELLOW 10975	PE		Pigments	5-6 (1-layer) 20 (bicolor)
SILVER 80100	PE		Pigments	2-3 (*)
GREEN 51311	PE		Pigments	1-1.5
GREEN 51670	PE		Pigments	15 (*)

(*) for 20-30 mic. films

Exact addition rates depend on area of use, film type, structure, thickness and required specifications.
Other additive masterbatches for agricultural films can be offered upon request, containing different types, amounts or combinations of additives and colors.

Presentation: in regular pellet form, in bags, on pallets.

PRODUCTS & APPLICATIONS

1. Disease control masterbatch

UV 23 strongly absorbs UV-radiation up to 390 nm. It can be used to help reducing the population of insects, the sporulation of certain fungi, the development of viruses as well as the blackening of rose petals. Recommended addition is 2-3 %.

Under certain conditions it has been observed that complete blocking of UV-radiation may result to unwanted side-effects (discoloration of egg-plants and some kinds of flowers/fruits, disturbance of bumble-bee activity). Please consult our R&D Dept for more information.

2. Infra-Red masterbatches

Infra-Red masterbatches contain additives that absorb heat emitted from the greenhouse or low-tunnel during the night, thus helping to maintain higher night temperatures, reduce fuel consumption for heating, prevent frost and temperature inversion.
- IR 550 is an effective inorganic Infra-Red absorber. Recommended addition in LDPE films is 5-15 % depending on film thickness and required "thermic effect". For LDPE/EVA co-extruded films, recommended addition is 2-10 % depending on film thickness, VA content of the film and required "thermic effect".
- HT 555 is a special IR-absorber that does not affect film clarity. For better results, it is recommended to combine it with EVA, at an addition of 2-4 %.

3. Anti-dripping masterbatches

Anti-dripping masterbatches prevent droplet formation in the internal surface of greenhouse films.
- AF 61 is a highly concentrated anti-dripping masterbatch suitable for LDPE and EVA with low VA content. Recommended addition is 6-12 % for an anti-fogging effect of 1-2 years.
- AF 62 is an anti-dripping masterbatch with fast and strong action, mainly recommended (at 6-12 % addition) for short-term exposure (4-8 months) on relatively flat structures or on the soil (e.g. asparagus mulch films).

Notes : a) due to the complex nature of anti-dripping effect and to the numerous parameters that affect its performance, PLASTIKA KRITIS does not provide any guarantee whatsoever on the effectiveness or duration of the anti-dripping effect b) on greenhouses covered with anti-dripping films there is often appearance of fog. It is recommended to eliminate this fog by ventilating and/or heating the greenhouse. For more information on this phenomenon and on solutions available, please consult us.

4. Anti-dust masterbatch

AS 40 is used for achieving reduced level of dust accumulation on the surface of greenhouse films. Recommended addition is 1 %. In multi-layer films, it is advisable to use AS 40 only in the layer of the film that faces outside, at 3 % addition.

5. Anti-sticking masterbatch

AS 40 is used to reduce sticking of EVA blown-films during extrusion and storage. Recommended addition level is 2-4 % depending on the VA content of the material, film thickness and production conditions.

6. Diffuser masterbatch

KRITILEN DIFFUSER 557 provides an opacifying effect combined with increased haze/diffusion when used in polyolefin films, without affecting the product's color.

7. Photoselective masterbatches for mulching films

i. BROWN 70869 is used at an addition of 20 % (*). It permits the heat to pass and warm-up the soil during daytime, while providing adequate opacity to prevent growth of weeds.

ii. BROWN 70964 is offering the same advantages as BROWN 70869, and in addition it contains an IR-absorber that reduces heat losses from the soil during night-time.

iii. GREEN 51670 is used at an addition of 8 % (*) and permits heating-up of the soil while limiting considerably the growth of weeds.

iv. YELLOW 10975 is used at an addition of 5-6 % (*) in mono-layer films and up to 20 % in multi-layer bicolor films. Its function is to attract certain insects (such as white fly) and reduce damage on the crops.

v. SILVER 80100 is used at an addition of 2-3 % (*) to reflect sun-rays and repel insects. It has a noticeable effect in reducing viruses and protecting plants.

vi. GREEN 51311 is used to produce films with the greenish shade of Ni-quencher. The usual addition rate is 1-1.5%.

(*) Addition rates are indications for trials only, based on our experience, and refer to 20-30 mic. films. They have to be adjusted taking in account the required opacity and the exact thickness and structure of the film.

For extending the lifetime of the films beyond 2-4 months (depending on area) it is necessary to add UV-stabilizers (please consult our R&D Department for an advice). It should be noticed that certain pigments contained in the above masterbatches have a negative effect on UV-resistance, therefore an increased level of UV-stabilization is necessary relative to transparent films.

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LIMIT OF LIABILITY

The information and suggestions contained herein are the result of our experience, knowledge and research. They are believed to be reliable and are given in good faith. However no guarantee is provided, as the conditions under which our products are used are beyond our control.

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