

Masterbatches

Your Added Protection
CESA® Additive Masterbatches



Exactly your chemistry.



CESA[®] Additive Masterbatches

The technology leader in color and additive concentrates for plastics, Clariant Masterbatches delivers innovative performance solutions to processors, resin manufacturers and end users around the world.

Specified in virtually every major market and industry, Clariant's comprehensive line of CESA additive masterbatches offers unprecedented opportunities to improve the properties, performance and quality of finished products, while also optimizing productivity and costs.

The CESA product line includes an exceptionally broad selection of standard additive masterbatches for use with all commercially available

polymers. In addition, we can develop custom masterbatches as well as masterbatches combining active ingredients with selected pigments and dyestuffs, in order to meet virtually any special customer requirement.

With advanced technology, unparalleled creativity and global expertise, Clariant is uniquely positioned to help our customers make their products the very best they can be. Wherever you are located, however challenging your application, you can rely on the high performance and consistent quality of CESA additive masterbatches from Clariant.

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A Global Portfolio of Performance Enhancements

UV Stabilizers

Light radiation and oxygen in the air trigger decomposition processes in plastics that not only change their appearance, but also adversely affect their mechanical and physical properties. Light stabilizers are used to protect plastics from discoloration, embrittlement and eventual degradation caused by exposure to ultraviolet light. Applications include agricultural films, construction materials, lawn and garden equipment, signage and many other products used outdoors, as well as products exposed to fluorescent light and filtered daylight indoors.

Flame Retardants

Flame retardant additives make plastics safer by making them more difficult to ignite and by controlling their burning behavior. Widely used in transportation, construction, appliance and electronic applications, flame retardants help manufacturers meet UL and other regulatory requirements by minimizing flame propagation, smoke and heat generation.

Antistats

Antistatic agents prevent a buildup of static electricity on polymer surfaces. Static charges not only attract dust and dirt, but can also cause sheet or film to cling, stacked polystyrene cups to stick and powder to bridge. A sudden discharge can create sparks that may damage products such as computer chips and also invite risk of explosion in hazardous areas. Antistats help avoid such problems, while also improving processability and mold release.

Antiblocking/Slip Agents

Antiblocking and slip agents modify the surface of polymeric sheet or film, making it rougher or more slippery. They are

used to prevent thin films, sheets and thermoformed articles from adhering to each other and to the metal surfaces of thermoforming equipment during processing.

Antislip Agents

Filled polyethylene heavy-duty bags have a tendency to slip and slide when stacked in layers, such as on pallets. The addition of antislip agents improves stackability by roughening the surface of the film, reducing its slip properties.

Corrosion Inhibitors

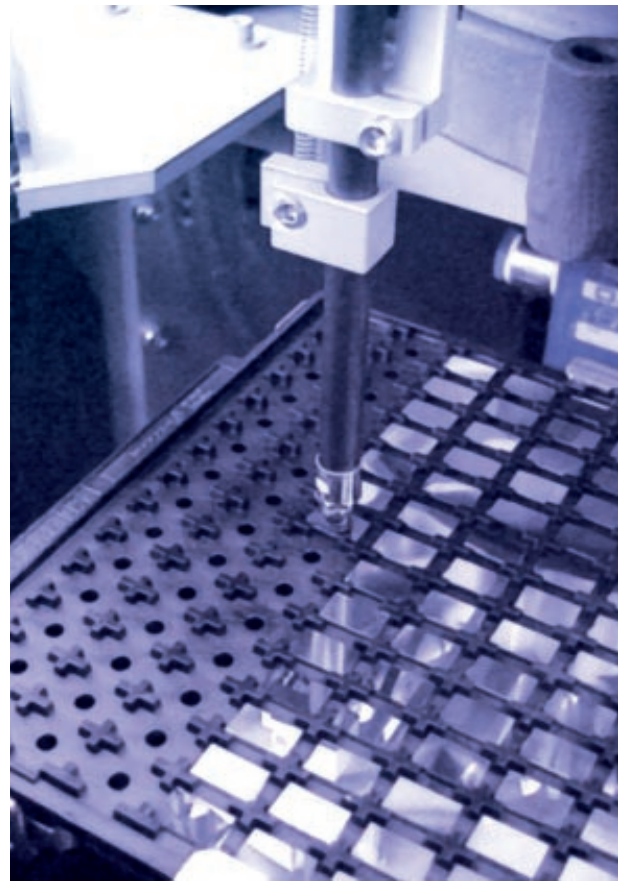
Typically added to packaging films, corrosion inhibitors protect the appearance and extend the service life of metal parts and components.

Antimicrobials

Without antimicrobials, bacteria and spores can grow on the surface of plastics, resulting in staining, odor and other undesirable characteristics, including premature product failure. Antimicrobials protect plastic film, fibers and molded products against bacterial growth, fungi, mold and mildew.

Antioxidants

Antioxidants, often called heat stabilizers, are organic substances that inhibit or retard polymer oxidation and its degrading effects. These include discoloration, change in viscosity, loss of physical properties, loss of clarity, and surface crazing or cracking.



Processing Aids

LLDPE, LLPDE-rich blends and metal-locene resins are often extremely difficult to extrude due to severe problems with melt fracture during processing. Processing aids are designed to coat the inner surface of the extrusion die, reducing friction between the melt and the metal to facilitate processing.

Laser Marking

Although several laser sources are used to mark plastics, the most common is the Nd-YAG system. Extremely flexible, it works by scanning or tracing, resulting in an excellent fine and indelible print.

UV Stabilizers

Just as unprotected human skin suffers from sunburn due to excessive ultraviolet radiation, plastics are also damaged by exposure to light.

CESA-light UV stabilizers provide outstanding protection against the degrading effects of sunlight, heat and oxygen on the mechanical, optical and physical performance of plastic parts.

The CESA-light product family includes three major classes of UV stabilizers:

- 1** UV absorbers, which absorb harmful UV radiation, dissipating it as “harmless” thermal energy. Widely used in food, drug and personal care packaging, these active ingredients perform best in products with relatively thick wall sections, such as transparent blister packaging and hollow cosmetics tubes. Films, fibers and other products with thin cross sections will be afforded only limited protection by UV absorbers.
- 2** Nickel quenchers, which take over the absorbed energy and dispose of it either as heat, or as fluorescent or phosphorescent radiation. Their action

is independent of polymer thickness, and they are mainly used to stabilize pesticide-resistant agricultural films.

- 3** Hindered amine light stabilizers (HALS), which do not absorb UV radiation, but act as radical interceptors, effectively inhibiting polymer degradation. Significant stabilization levels can be achieved at relatively low concentrations, regardless of wall thickness.

Although current understanding of HALS is incomplete, it is believed that they convert nitro-oxyl free-radicals under photo-oxidative conditions and may also cause the deactivation of carbonyl groups.

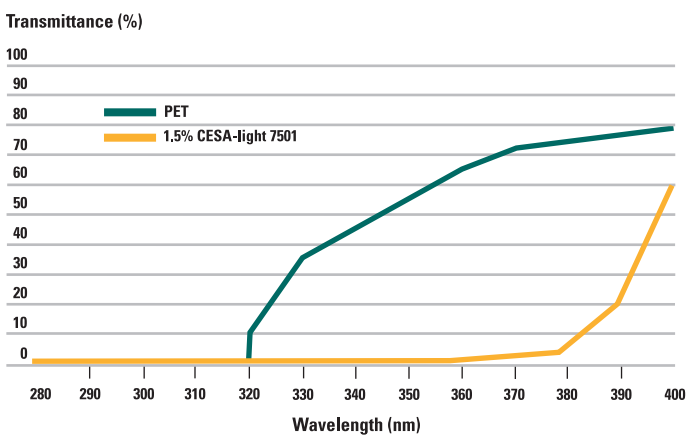




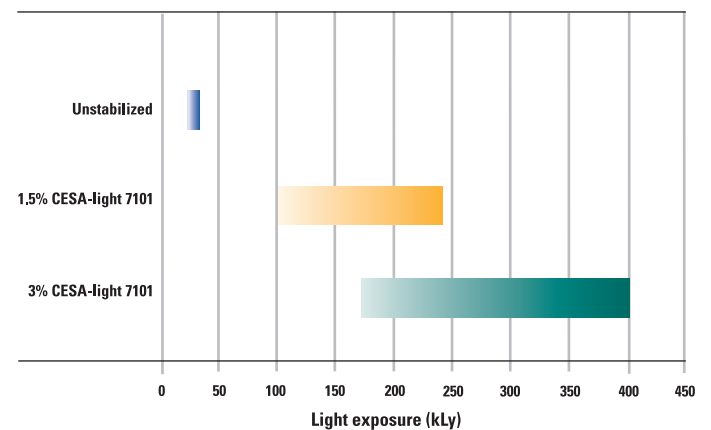
HALS and UV absorbers are frequently used in combination to achieve the highest possible levels of light protection. For example, CESA-light 7105 masterbatch, developed for stabilization of shrink film, is based on HALS, UV absorbers and antioxidants.

Another product, CESA-light NEA0050145, is a highly concentrated UV-absorber masterbatch developed for PET packaging to protect UV-sensitive ingredients in cosmetics, beverages and other products. At 0.8% dosage, it offers an optimum balance of price and performance.

UV Transmittance



Light Stabilization



This test, indicating 50% retained elongation after accelerated exposure, was conducted using dosages of 1.5% and 3% CESA-light 7101 in 100 µm LDPE film.

Flame Retardants

Since almost all plastics are based on hydrocarbons, they are combustible.

CESA-flam flame retardant masterbatches help to protect people and property by delaying the spread of fire and toxic by-products and, in some cases, preventing ignition entirely.

Unlike reactive flame retardants, which are incorporated into the polymer molecule during polymerization, flame retardant masterbatches allow variable dosing levels and thus flexibility during processing. The effects may be either physical or chemical, occurring in either the gaseous or solid phase.



The most common flame retardants include the following:

1 The effectiveness of inorganic hydroxides (such as magnesium hydroxide and aluminum trihydroxide) is based on the dilution of the plastic as a combustible material – more specifically, on the dilution of the incendiary gases and on the absorption of energy by endothermic reactions. Because of their very high dosage requirement (>50%), inorganic hydroxides are preferably used in compounding.

2 Halogenated flame retardants (e.g., brominated and antimony systems) actively intervene in the free-radical-based combustion reactions in the gaseous phase and form less reactive byproducts. This delays or interrupts auto-catalytic combustion. Highly efficient, halogenated flame retardant additives are especially suitable for manufacturing flame retardant concentrates.

3 Compounds containing phosphorous, which facilitate the formation of a protective layer of carbon via the phosphoric acid produced during a fire. These have specific effects that are less universal in application.

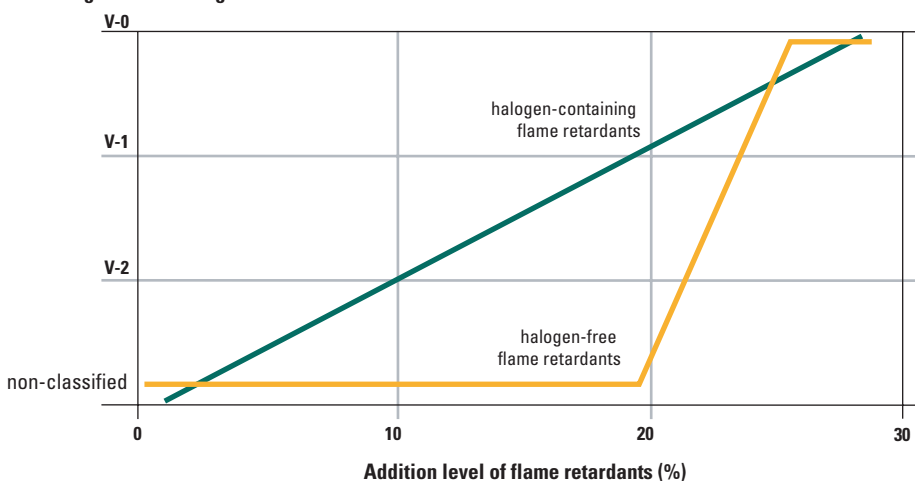
4 Intumescent systems, which cause the formation of a protective, ceramic-like layer via a combination of active agents (organophosphorous compounds combined with a “foaming agent”). Intumescent systems also have limited applications.

CESA-flam masterbatches offer a wide range of very efficient and universally usable halogenated flame retardants, as well as some specific halogen-free solutions. They are used primarily for extrusion and injection molding applications in LDPE, LLDPE, HDPE, PP, PS, ABS and engineering resins. A few CESA-flam grades have been specifically developed for fiber applications.



Flame Retardancy

Flame-retardant rating according to UL94 testing



Antistat, Antifog & Conductive

Antistat

The chemical structure of plastics makes them particularly susceptible to buildup of electrical charges, which attracts dust and accumulated static electricity. Eliminating the electric charges to maintain good product appearance is a must for successful marketing of food and cosmetics packaging. It is also critical to protect sensitive electronics packaging and to reduce a major fire hazard in production environments.

CESA-stat antistatic masterbatches are formulated for use with virtually all polymers in injection molded, blow molded and extruded applications. They are easier to disperse uniformly than antistatic agents in liquid or paste form. The active ingredients of CESA-stat masterbatches can also be combined with other additives and pigments in a single easy-to-use masterbatch.

Antistatic agents are additives whose efficiency is measured either by determining the surface resistivity or the static decay. Without antistatic agents, the surface resistivity of plastic is typically between 10^{14} to 10^{15} ohms. Antistatic additives will lower the surface resistivity to 10^9 to 10^{12} ohms. In order to achieve a higher conductivity, conductive fillers such as carbon black or carbon fibers or powdered metal must be added to the plastic.





Antifog

Food packaging and horticultural films used with water-containing products often fog over on their inner surface due to the condensation of tiny droplets of moisture. Droplets are particularly undesirable in greenhouse films, where good light transmission is essential for crop growth.

CESA-nofog additive masterbatches eliminate the problem by lowering the surface tension of the water droplets, causing them to merge and form a

continuous transparent layer that maintains the clarity of the film. For example, **CESA-nofog 2101** was developed for LDPE and LLDPE food packaging film. It does not affect the transparency of the film and withstands sudden temperature variations.

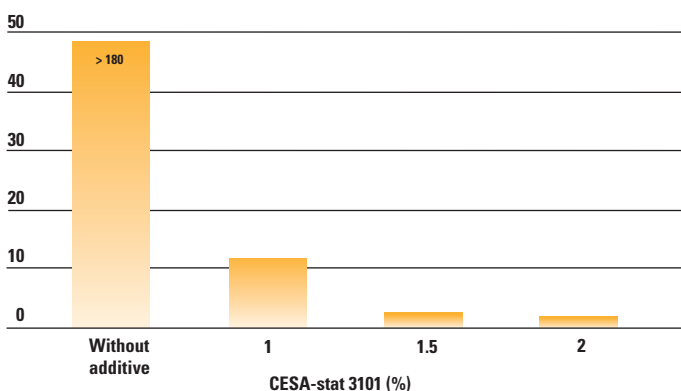
Conductive

While the good insulation properties of polymers are desirable in a wide range of applications, their typically very low

electrical conductivity sometimes restricts their area of application. The use of **CESA-conductive** compounds and masterbatches improves electrical conductivity, enabling plastic parts, for example, to protect highly sensitive electronic components from damage caused by electrostatic discharge. Conductive compounds are also increasingly used in components for transporting hazardous materials.

Charge Decay

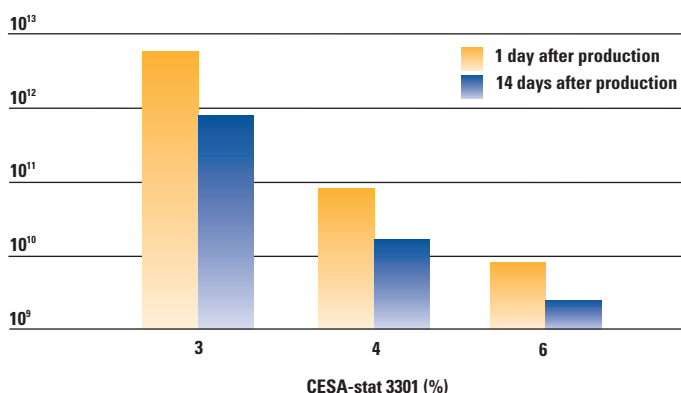
Half-time charge decay (sec.)



This test was conducted using CESA-stat 3101 in LDPE injection molded plaques, 1 mm in thickness, 3 days after manufacture.

Surface Resistivity

Surface resistivity (ohm)



This test was conducted using CESA-stat 3301 in 1 mm molded plaques of HIPS, at 50% relative humidity, per test method ASTM D257.

Antiblock, Lubricants & Nucleating Agents

Antiblock

CESA-block antiblocking additives modify the surface characteristic by creating a slight surface roughness or smoother surface, thus reducing the coefficient of friction. This prevents self-adhesion of plastic film or sheet, making it easier to handle. Typical applications include polyolefin films and polyester sheets used in food packaging.

Depending on the grade specified, CESA-block provides very good dispersion, optical properties and efficient antiblocking effects even at low dosing ratios. As an example, CESA-block 1102 is a masterbatch containing effective active substances in an LDPE carrier. Its good dispersion and small particle size make it suitable for thin-gauge applications. The suggested dosage is 0.5 to 1%.

Lubricants

CESA-slip lubricants improve the flow characteristics of plastics during processing. They also reduce the frictional resistance of end-product surfaces, enhancing both appearance and function. In addition, CESA-slip masterbatches can act as plasticizers and impact enhancers, as well as antiblock, antitack and antistatic agents.

CESA-slip can be used in conjunction with other plastics additives including release agents and heat stabilizers. For example, CESA-slip PEA0050534 combines slip and antiblocking agents in an LDPE carrier material. It improves slip properties at a dosage of 1%.

Nucleating Agents

CESA-nucleant masterbatches are mainly used to clarify PP resin. They influence the degree of crystallinity of polymers and increase hardness, tensile strength, modulus of elasticity and yield point, while also reducing cycle times. CESA-nucleant greatly improves optical properties such as transparency or translucency.

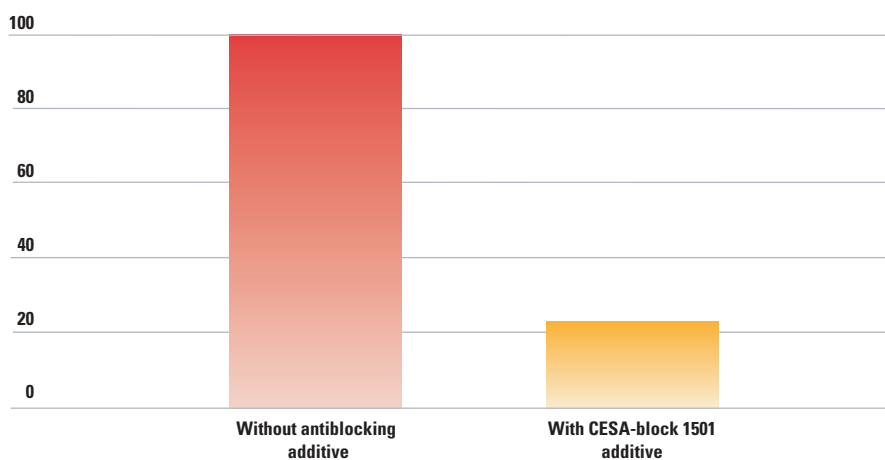
Chemical foaming agents, materials that generate gas upon decomposition, also act as nucleating agents. The fine-grain spherulite structure of ingredients incorporated in Clariant's HYDROCEROL® chemical foaming agent makes it an

ideal nucleating agent in direct gassed PS and polyolefin foams. The nucleating effect results in small cell sizes.

HYDROCEROL nucleating agents are available for gassed foam extrusion in powder and masterbatch form, in various concentrations and carrier systems. The optimal dosage of HYDROCEROL nucleating agents depends on the desired foam quality and all the other variables in the process. For optimization, a starting dosage of 0.2 to 0.3% (based on active ingredient) has proven to be favorable.

Antiblocking Efficiency

Denesting force (%)



This blocking force test was conducted using CESA-block 1501 in PET film, 300 µm thick, use levels 0 and 3.5% respectively.

Infrared & Corrosion Inhibitors

Infrared

CESA-IR masterbatches have been developed for use in agricultural thermal films. While maintaining transparency, they allow penetration of short-wave IR radiation coming from solar rays, yet prevent the emission of longer-wave IR radiation. This increases heat retention, supports plant growth and allows greenhouses to maintain an adequate temperature, even at night.

Corrosion Inhibitors

CESA-cor anticorrosion concentrates are used to protect ferrous and most non-ferrous metals from the deteriorating effects of corrosion. Typical applications are films used for packaging ball bearings, automotive spare parts and other metal components.

When extruding PE film with CESA-cor, the active inhibitors are vaporized and well dispersed. The film protects the packaged part by condensing on the surface of the metal.

CESA-cor corrosion inhibitors are nitrite-free, have a neutral odor and produce no adverse effects on the working environment.



Antimicrobials

Microorganisms such as fungi and bacteria are present in all environments, although they are invisible to the naked eye. The reproduction and growth of bacteria, fungi, mildew and molds happen rapidly on plastic surfaces. **CESA-antimicro** masterbatches inhibit the growth of these microorganisms, helping to prevent unpleasant odors, discoloration, and surface degradation of plastic parts.

Typical applications for antimicrobials include fibers and textiles used in athletic gear and household furnishings, kitchenware and bathroom products, automotive steering wheels and interior parts, pharmaceutical and medical products, and a spectrum of other plastic applications requiring a high standard of hygiene.

There are two major types of antimicrobials, both of which are represented in the CESA-antimicro product line. Organic antimicrobials consist of substances that migrate within the polymer matrix, spreading over the surface of the materials where their antimicrobial action has effect. Organic antimicrobials are effective at low concentrations, offering a favorable cost/performance ratio in polymers that are processed at temperatures not exceeding 250°C (482°F).

Inorganic antimicrobials incorporate substances containing silver in ionic form, bound to inorganic compounds that regulate the diffusion of ions within the polymer mass. The silver ion is the active ingredient that interacts with bacteria. Non-toxic, non-corrosive and flameproof, inorganic antimicrobials have

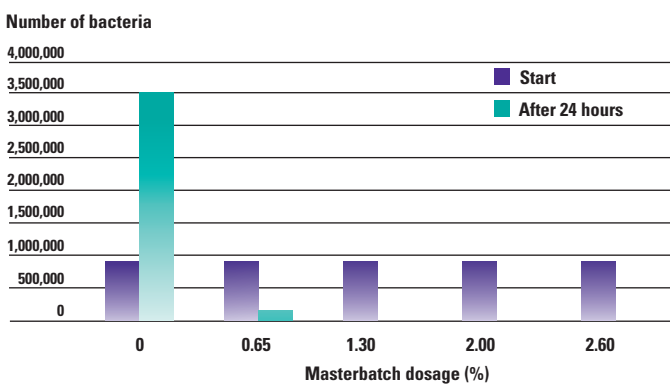
no negative impact on plastics processing. They are highly recommended for objects requiring long-lasting antimicrobial action and for engineering polymers that are processed at high temperatures.

Clariant's wide range of CESA-antimicro masterbatches answers every requirement regardless of the resin or process.

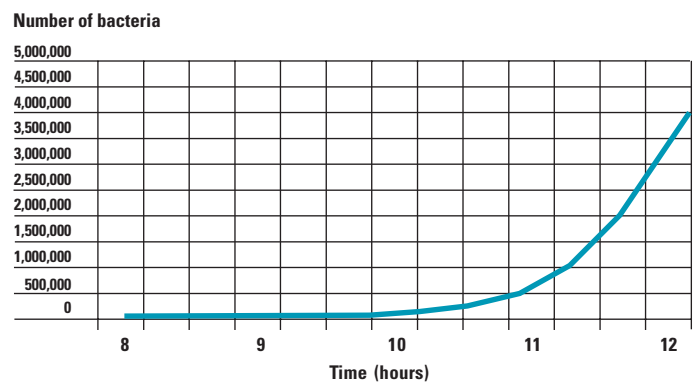




Antibacterial Effect on Plastic



Bacterial Growth on Plastic End Article



Antioxidants

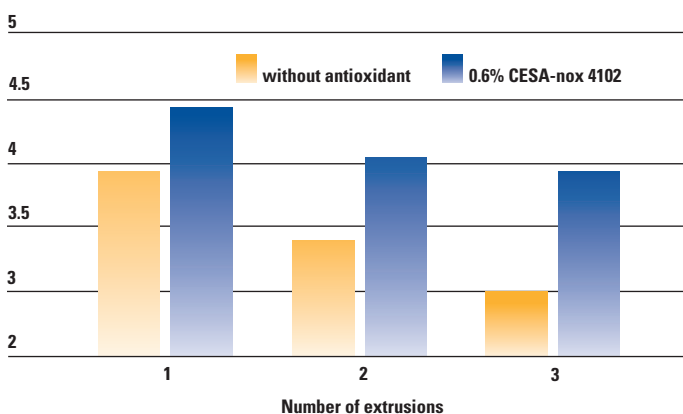
Oxidation and heat aging are major causes of degradation of plastics.

Exposure to heat and oxygen causes a chain reaction involving the formation of free-radicals, which inevitably leads to cleavage of the main chains in the polymer and degradation of the plastic. This is manifested in many different ways including loss of shine and transparency, yellowing, surface cracking and odors. Oxidation can also result in loss of mechanical properties such as impact resistance, elongation and tensile strength.

CESA-nox antioxidant masterbatches are formulated to combat thermo-oxidative decomposition at every stage of the plastic life cycle, from manufacturing, drying and processing through end use. They are particularly suitable for use in LDPE, LLDPE, HDPE and PP. One example is CESA-nox 4201, a masterbatch based on a combination of antioxidants for long-term heat protection of polypropylene caused by severe outdoor and/or heat exposure.



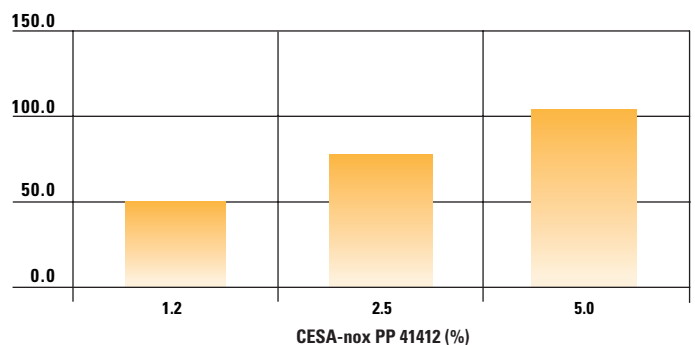
Antioxidant Efficiency



Multiple processing was performed by extrusion of LDPE at 240°C, 0.6% CESA-nox 4102 addition rate.

Heat Aging Test

Heat aging resistance at 150°C (days)



Test at 150°C on 1 mm thick homopolymer PP plaques
Evaluation: embrittlement time (days)

Drying Agents & Compatibilizers



Drying Agents

CESA-dry desiccant masterbatches eliminate the need for pre-drying resin before processing, and also help to protect metal tools from oxidation. They are particularly recommended in applications where high moisture levels negatively influence processability.

For example, CESA-dry MB 1, a concentrate of specific active substances in a polyethylene carrier, can be used to facilitate processing of recycled resins, resins containing biodegradable starch and other high-moisture-level polymers. It is also suitable for injection and blow molded polyolefins.

Compatibilizers

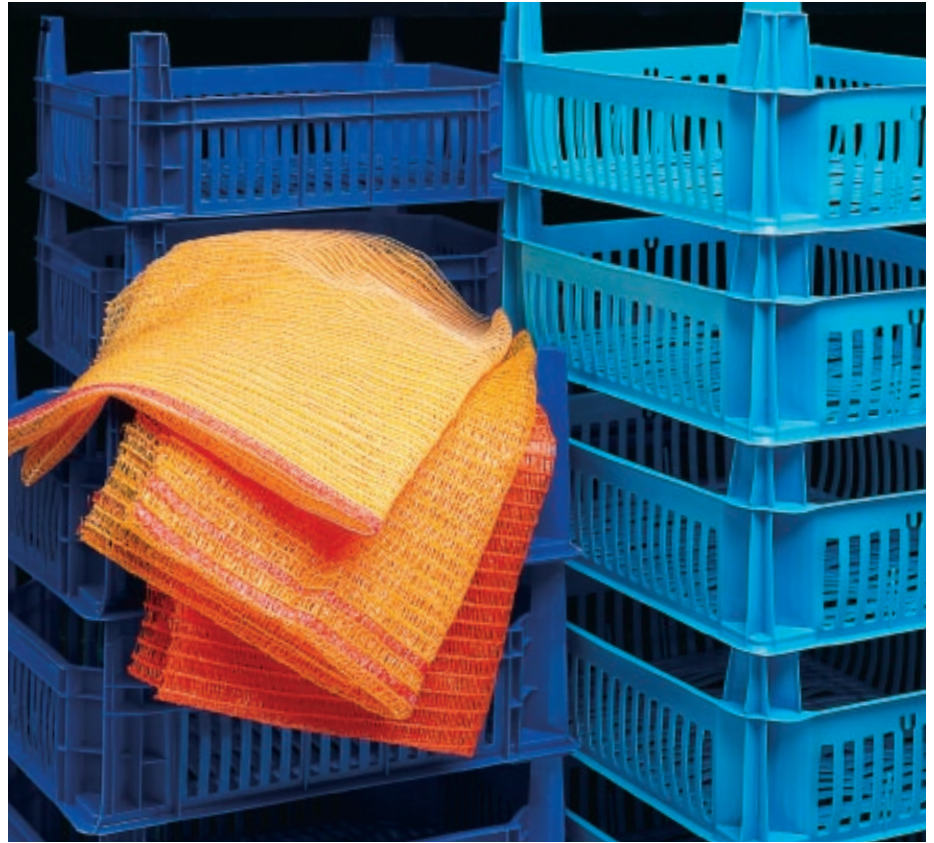
When resins and certain reinforcing materials are not compatible, the addition of an appropriate compatibilizing material may allow them to be blended or alloyed. **CESA-mix** compatibilizers bridge the gap between different resin chemistries, enabling them to form a homogeneous structure.

Antislip & Fillers

Antislip

Many antislip agents consist of coarse particles that do not melt during processing. They must be large enough to protrude from the surface of the plastic film, producing a surface roughness that eliminates slippage.

CESA-grip antislip agents are based on organic and inorganic, non-migrating agents that have no adverse effect on screw wear. They are recommended to create a sandpaper-like surface modification of thick films (>80 to 100 microns). As an example, CESA-grip 9101 masterbatch is used for the production of film for heavy-duty bags. It produces a rough surface yet does not contain abrasive components. The suggested dosage is 1.5 to 2.5%.



Filler

CESA-fill masterbatches increase the bulk of compounds, reducing their cost. Their excellent polymer adhesion helps to improve part stiffness, hardness, thermal stability, flame retardancy and dimensional stability.

Processing Aids, Mold Release, Cleaning Agents & Regrind Optimization

Processing Aids

During the extrusion process, **CESA-process** masterbatches coat the inner surface of the die, reducing the friction between the melt and the metal and allowing polymers to extrude more easily. By lowering the friction and eliminating or reducing melt-fracture and die buildup, CESA-process enables difficult-to-process materials such as narrow-molecular-weight LLDPE and LLDPE-rich blends to run on existing extrusion lines.

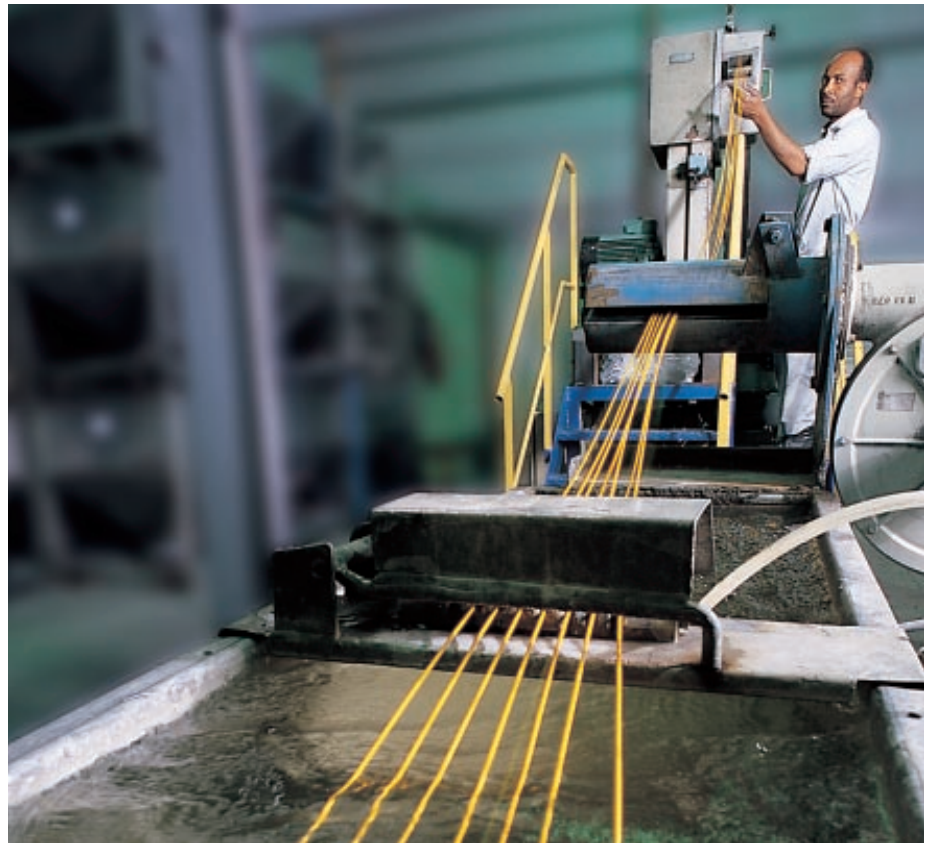
An example is CESA-process AEH603, a masterbatch based on fluoroelastomers. Developed for LLDPE and metallocene film extrusion, it can be used in conjunction with high quantities of fillers, antiblocking agents and inorganic pigments. In addition to eliminating melt-fracture and reducing die buildup, the use of this masterbatch enhances the optical properties of the film by improving its transparency.

Mold Release

The addition of CESA-release masterbatches to polymers during processing prevents parts from sticking to the mold cavity, facilitating their removal. Other advantages include reduced cycle times and increased machine output.

Cleaning Agents

Plastics processing periodically requires complete removal of thermo-oxidized deposits from extruders and injection molding machines. **CESA-clean** masterbatches permit fast, economical cleaning of machinery to facilitate color or resin changes with minimal downtime and loss of virgin material.



One example is CESA-clean 9104 masterbatch, a balanced mixture of surface-active substances and fillers with a low abrasive power, based on low-density polyethylene. Widely used for purging extruders and injection presses, the masterbatch allows quick changes of color and materials of varying viscosities.

Regrind Optimization

Re-using post-industrial or post-consumer polyester regrind has typically been limited due to the adverse effects of heat and moisture on the virgin resin. **CESA-extend** masterbatches utilize an oligomeric reactant to repair the damage and restore the resin's Intrinsic Viscosity (IV). Processors can then use higher proportions of recycled resin while maintaining the same processing properties as virgin PET.

A series of CESA-extend masterbatches with a variety of carrier resins is available for clear and opaque applications. These include extruded polyester sheet and strapping, stretch blow-molded PET bottles, foamed PET sheet or film and pelletizing undried recycle or scrap.

Laser Marking, Phosphorescents, Optical Brighteners & Opacifiers

Laser Marking

Laser marking utilizes the energy of a highly focused laser beam to produce a combined thermal and photochemical effect. PVC, polyolefins and other polymers that are highly sensitive to laser radiation require special additives to make laser marking viable. **CESA-laser** masterbatches provide an effective solution. They also extend the limits of the technology by making it possible to mark in colors in addition to traditional gray tones.

Phosphorescents

Phosphorescent pigments are characterized by their ability to absorb and store the energy of natural or artificial light, and then emit this energy in the form of visible light in the dark. **CESA-lux** masterbatches enable molders to produce glow-in-the-dark extruded or molded articles.

Optical Brighteners

Often a brilliant appearance with a bluish undertone is desirable for thermoplastic articles, particularly for polymers with an inherently slightly yellow cast. Topical optical brighteners have typically been used to improve the surface whiteness of plastic articles and synthetic fibers.

Adding **CESA-bright** concentrates to the polymer itself produces much better brightness retention over time than surface treatment with topical optical brighteners. **CESA-bright** masterbatches convert UV radiation into visible, bluish light, improving the long-term appearance of finished products.



Matting Agents & Opacifiers

CESA-mat masterbatches contain application-specific additives to modify the surface properties of plastic products. They reduce gloss, giving a matte or frost-like effect to PET sheets and bottles, polyolefin films and a wide range of other products. They also are used to impart whiteness and opacity to plastic products, enhancing their appearance by light diffusion.

Available in a number of different carriers ranging from polyolefins and styrenics to engineering resins, **CESA-mat** masterbatches are suitable for use in injection and blow molding, film and sheet extrusion and other processes.



One application example is **CESA-mat** NEA00500116 opacifier, used to obtain eye-catching aesthetic effects in PET bottles. Dosing level is 1.5 to 3.0%, depending on the desired effect.

CESA Additive Masterbatches

Product Line

Clariant provides a diverse and comprehensive range of additive masterbatches from UV stabilizers and flame retardants to antistats, antioxidants and antimicrobials.

UV Stabilizers

CESA-light	Dosage Rate %	PE			PP		PS	PET
		Stretch Film	Shrink Film	Injection Molding	Spin Dyeing	Injection Extrusion	Injection Extrusion	Injection Extrusion
7101	1.5-3	▲	◆	▲		◆		
7102	0.75-2	▲		▲		◆		
7103	0.5-3	▲	◆	▲		◆		
7104	1-3					▲		
7105	1.5-2.5		▲					
7201	0.5-4				▲	◆		
7202	0.5-4				▲	◆		
7301	1.5-3						▲	
7501	1-3							▲

Flame Retardants

CESA-flam	Dosage Rate %	PE		PP	ABS
		Film Extrusion	Injection Molding	Injection Extrusion	Injection Extrusion
5101	3-20	▲	◆		
5102	3-3.5			▲	
5201	3-20			▲	
5401	20				▲

Antistats

CESA-stat	Dosage Rate %	LDPE-LLDPE		HDPE	EVA	PP	PS	ABS
		Film Extrusion	Injection Molding	Film Extrusion	Injection & Blow Molding	Film & Injection Molding	Injection Molding & Extrusion	Injection Molding & Extrusion
3101	0.5-3.5	▲	◆	▲	▲	◆		
3102	0.2-1		◆	◆	▲	◆	▲	
3103	0.5-3	▲	◆	▲	▲	◆		
3104	1.5-5	▲		◆				
3105	0.8-1.5	◆	◆	◆		▲		
3301	4-6						▲	◆

Antifogging Agent

CESA-nofog	Dosage Rate %	LDPE		LLDPE
		Packaging Film Extrusion	Packaging Film Extrusion	Packaging Film Extrusion
2101	4-5		▲	▲

Antiblocking Agents

CESA-block	Dosage Rate %	LDPE		EVA	PP	PET	PETG
		Film Extrusion >30 micron	Film Extrusion <30 micron	Film Extrusion	Film Extrusion	Extrusion	Extrusion
1101	0.5-1	▲	◆	◆	◆		
1102	0.5-2	◆	▲	▲			
1501	2-3.5					▲	
1601	2-3.5					◆	▲

Lubricants

CESA-slip	Dosage Rate %	LDPE		HDPE		PP	
		Film Extrusion	Injection Molding	Film Extrusion	Injection & Blow Molding	Extrusion	Injection Molding
6101	0.5-2	▲	◆	▲	◆	◆	◆
6102	1-4	▲	◆	◆	◆	◆	◆
6103	0.5-1.5	◆	▲	◆	▲	▲	▲

The products listed on this page represent only a sampling of the comprehensive line of CESA standard additive masterbatches. In addition, Clariant can custom-formulate color and additive masterbatches to meet the most stringent and demanding application requirements.

Nucleating Agent

CESA-nucleant	Dosage Rate %	Homopolymer PP		Random PP	Copolymer PP
		Injection Molding	Sheet Extrusion	Injection Molding	Injection Molding
9201	1-3	▲	▲	▲	◆

Corrosion Inhibitor

CESA-cor	Dosage Rate %	PE		PP
		Film Extrusion	Injection Molding	Injection Molding & Extrusion
9103	3-6	▲	◆	◆

Antioxidants

CESA-nox	Dosage Rate %	Long-Term Stability LDPE/HDPE		Process Stabilization LDPE/HDPE	PP	
		Film Extrusion	Injection Molding	Extrusion	Recycling	Injection & Extrusion
4101	1-5	▲	◆			
4102	0.5-5	◆	◆	▲	◆	◆
4201	1-5				▲	▲

Antislip

CESA-grip	Dosage Rate %	LDPE	LLDPE
		Heavy-Duty Bags	Heavy-Duty Bags
9101	1-3	▲	▲

Processing Aid

CESA-process	Dosage Rate %	LLDPE	LLDPE/LDPE	HDPE	PP
		Film Extrusion	Extrusion	Extrusion	Extrusion
9102	0.5-1.5	▲	▲	◆	◆

Cleaning Agent

CESA-clean	Dosage Rate %	PE	PP	Polyolefins	Other Thermoplastics
		Extrusion & Injection Molding	Extrusion & Injection Molding	Color Change	Extrusion & Injection Molding
9104	50-70	▲	▲	▲	◆

▲ Highly Recommended
◆ Recommended

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