Plastic Additives

Your key components for reliable performance in the electrical & electronics industry

BASF
We create chemistry

Adding value to plastics

The choice of the best plastic additives is a crucial factor for success in plastic applications. It calls for a reliable partner who not only offers a wide product portfolio but can also provide innovative solutions that can fulfill today's and tomorrow's requirements.

Long-standing expertise and a toolbox approach make BASF the best partner for innovative and customized solutions. New developments and continuous improvement of its portfolio as well as close cooperation with its customers enables BASF Plastic Additives to drive sustainability and reliability in all kinds of plastic applications.

Plastics are valuable materials that offer safe, durable, and cost-efficient solutions. In many cases the use of plastics can be more sustainable than the use of other materials. BASF Plastic Additives offers products that can help to mitigate negative impacts on the environment and also by extending and closing the loop in the circular economy of plastics.

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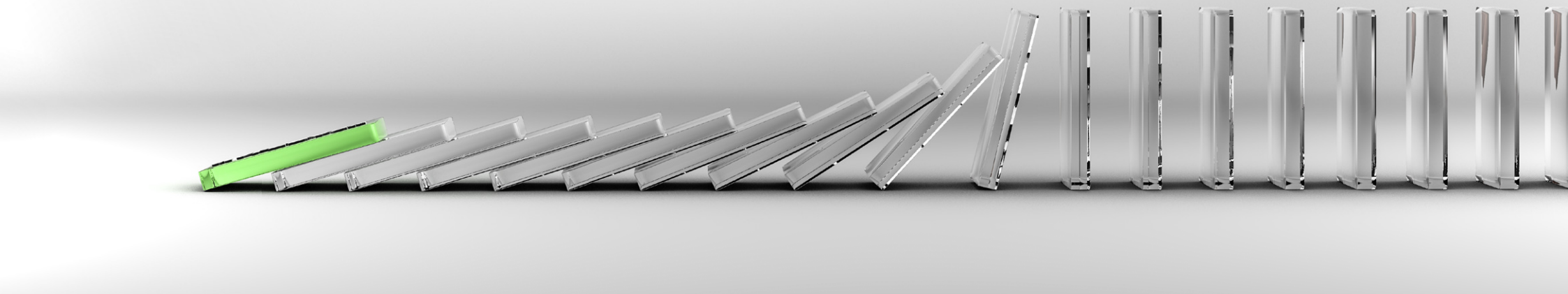


Additives, the enablers for plastic

Plastics are an essential resource in a multitude of applications where they provide outstanding performance in light weighting, ease of use, and functionality. Offering high durability where needed, reliable quality, and safety, they play a vital role in raising living and hygiene standards as well as improving the resource and energy balance.

Public opinion usually associates plastic with single-use products, which might be a reason why plastics have a rather poor image, but plastics are used in many essential applications in various industries. Plastic additives are enablers that can actually contribute to more sustainability when incorporated in the value chain of present and future industries.

Plastics offer features and benefits that other materials do not, and in many cases the alternatives do not have a better sustainability profile. Therefore, the main challenges facing the plastics industry today are to improve sustainability along the entire value chain and to reduce or even eliminate plastic waste in the process.

BASF Plastic Additives supports that process by supplying solutions that contribute to longer product lifetimes, safe and reliable use, as well as resource and energy efficiency. Those properties allow to integrate plastics in a more sustainable way in modern value chains.

Adequately stabilized plastics enable a **very efficient** use of resources, especially during the use phase. At the end of their life, plastics are still very valuable **resources that can be transformed** into new feedstock or into energy.

BASF Plastic Additives help to:

Improve the sustainability profile of plastic products by …

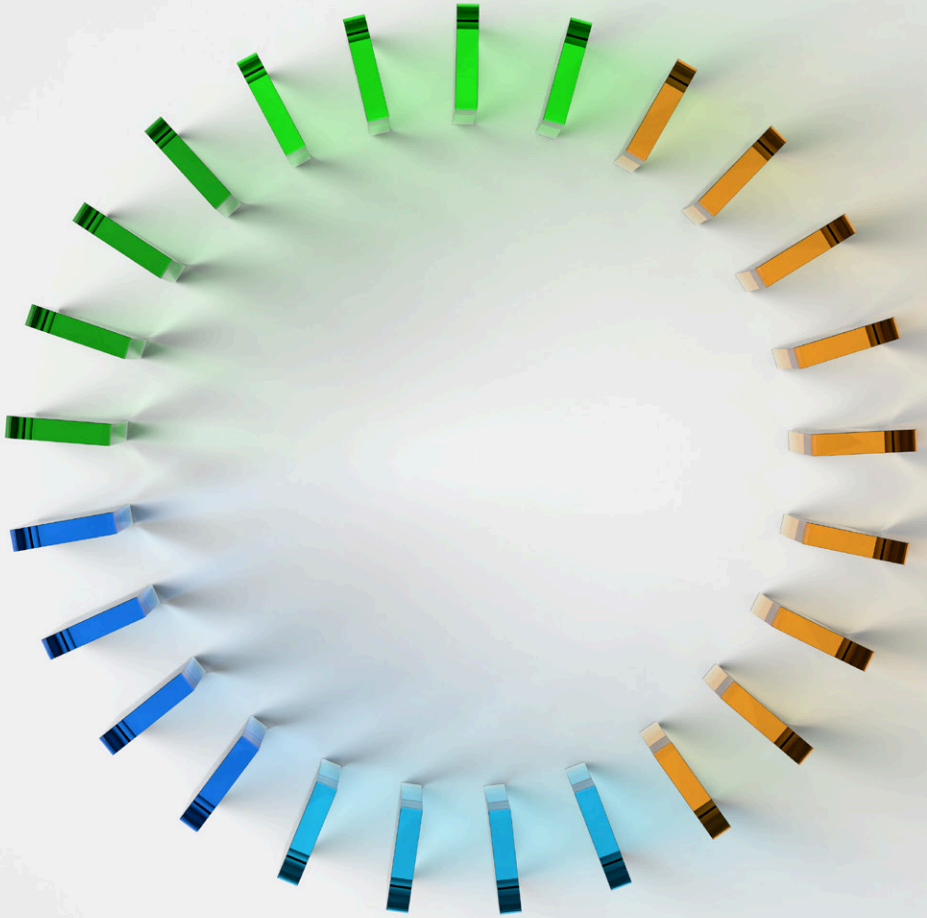
… extending product lifetimes with solutions that increase durability, and improve resistance to thermal, UV and chemical exposure.

… enabling better processing and performance of recycled plastics with the IrgaCycle® toolbox.

Provide cost-efficient solutions on a global scale by …

… enabling applications where plastics last longer and require less maintenance than other materials.

… reducing the volume of raw materials and energy needed.



Ensure the safety and reliability of plastics by …

… reducing exposure to undesirable by-products and residues with high-quality and extensively tested products.

… enhancing the safety of applications which require fail-safe stability and flame retardancy.

… ensuring that BASF's customers can fulfill and meet regional requirements.

VALERAS®
creating new **VAL**ue for plastics in an **ERA** of **S**ustainability

Join us on this journey. Take a look at our customer stories, featured products, and exceptional services to make sustainable plastics a reality.

Plastics fulfill essential tasks in modern industries, which is why they play a substantial role in the shift towards a more sustainable future. With society and customers becoming increasingly aware of the importance of a holistic view of the value chain and cradle-to-grave approaches, plastics can be seen for what they really are: valuable materials that, with the help of additives, become enablers of more sustainability for many industries.

BASF Plastic Additives aims to promote this sustainability and support its customers with high value plastic additives and solutions to meet market needs. Together we can make plastics lighter, stronger, more durable and safer. It is why BASF Plastic Additives has brought its most sustainable products, innovative solutions, regulatory support, and longtime experience under one brand: VALERAS®. The VALERAS® portfolio includes BASF plastics additives that offer significant sustainability benefits for the plastics industry in many categories including improved durability, energy savings, or by reducing emissions.

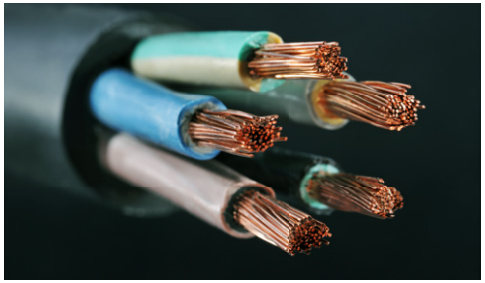
Beyond that, BASF promotes the acceleration to a circular economy by developing new and innovative solutions to extend and close the loop. Ensuring that the required properties of plastics are maintained over a longer product lifecycle helps to keep them in the loop and thereby save valuable resources. Innovative products such as IrgaCycle® enable recycling of plastics and by enhancing the quality of the resulting material to help close the loop.

BASF also provides support when it comes to compliance with regulatory requirements. RegXcellence® for plastic additives is part of the VALERAS® portfolio and offers targeted access to comprehensive global regulatory support for BASF customers.

VALERAS® by BASF Plastic Additives enables customers to achieve their sustainability goals.

Plastic additives for the **electrical & electronics industry**

Modern life without electricity is unimaginable. Whether it be domestic appliances, smart home technology, electric mobility or entertainment electronics – the electrical and electronics industry (E&E) is a driving force for innovations in digitalization and future technologies.



Plastics are a key material in the E&E industry. Thanks to their unique properties, cost-effective manufacturing is possible and proper functioning of various electrical applications can be guaranteed. Plastics are important parts of devices, cables, photovoltaic systems and many more applications, ensuring easy and safe handling with their flexibility, resistance and dielectric insulating properties. Plastic additives not only improve those properties, but also contribute to increased durability, energy efficiency, flame retardancy and recyclability.

Plastic additives are essential enablers in the E&E industry
Functionality is crucial when it comes to electrical and electronic applications. Harsh weather conditions, increasing customer demands, as well as changing regulatory requirements are challenges the industry is facing. BASF Plastic Additives helps the E&E industry master these challenges with its broad portfolio of solutions, addressing processing efficiency, durability, thermal and UV light stabilization, antistatic properties, and flame retardancy.

VALERAS®
Creating value for the E&E industry

People's safety and the protection of the environment are important aspects when it comes to E&E applications. Since those applications are used in all kinds of critical infrastructure, fail-safe functionality is imperative. In addition, excellent electrical insulating properties and durability under high temperatures are essential factors in all sectors of the E&E industry. Stabilizers help plastics resist thermal and UV light stress and can make them flame-retardant to ensure reliable and safe functionality.

Customers are increasingly expecting E&E applications to have longer product life cycles in order to avoid waste and save costs. BASF Plastic Additives offers an innovative portfolio of solutions that increases the durability of plastics and thereby contributes to a more sustainable way of consumption.

How BASF Plastic Additives **add value to your products**

Energy efficiency
It is a main goal of the E&E industry to ensure energy- and resource-efficient production processes. From smart electronics in cars to renewable energy systems and consumer electronics – plastic additives play a crucial role in enabling those features and helping to save energy in E&E applications.

Safety
Safety is crucial in E&E applications. Reliable functionality under harsh conditions and insulation from voltage must be guaranteed. Additives enable and improve those functions and even hinder fire and flames from spreading, thus enabling compliance with the growing regulatory requirements.

Innovation
Expectations to integrate more recycled materials in the E&E value chain are growing. Equipment manufacturers and regulators demand less use of new materials and the reuse of used plastics to lower the overall product footprint and save resources. BASF Plastic Additives supports its customers with solutions that enable higher quality recycled plastics.

Durability
Plastic additives are indispensable when seeking to reduce the costs of maintenance or arduous replacement of cables and other electrical and electronic appliances, because they enable them to withstand not only electricity but also the exposure to saltwater, UV light, heat, and various other external influences.

Innovative additives for the E&E industry
From electrical components to wires and cables, photovoltaics, and domestic installations – plastic additives bring out the best in plastics for the E&E industry. With its global production footprint, the highest quality standards, extensive regulatory knowledge, and an innovative approach, BASF's broad plastic additives portfolio can address not only customers' different demands and safety standards, but also help them meet their sustainability goals.

Additives enable plastic manufacturers to cope with the demands of many industries in the E&E sector and provide innovative solutions for electrical components, new smart grids, photovoltaics, electric vehicles, wearable technology and many more. BASF Plastic Additives provides light and heat stabilizers, as well as halogen-free flame retardants that reliably fulfill all regulatory standards such as WEEE and RoHS.

BASF has broad expertise in stabilization for wire and cable compounds in industrial use, which is crucial for reliable transmission and distribution of electric power. Thermoplastic compounds and resins are primarily used in insulation and jacketing. Polymer selection depends on voltage classification. BASF's thermal and light stabilization packages and metal deactivator systems make these polymers exceptionally durable and enable them to resist heat stress and degradation upon exposure to light and when in permanent contact with conductive materials.

Quality, reliable functionality, and durability are supported by the right combination of high-quality plastic additives.

Case Study

High performance power transmissions with Irgastab® Cable KV 10

The E&E sector is an essential part of many industries and therefore also needs to contribute to sustainability in the use of plastics. BASF Plastic Additives is a reliable partner for reaching sustainability targets in E&E.

Society and customer demand more sustainable power generation and less use of fossil fuels. The E&E industry can support this development by enabling better productivity, performance, and efficiency for applications. Along with those requirements, trends such as digitalization and automation, as well as growing safety and quality standards are developments that will have a lasting effect on the industry.

BASF's plastic additives support and enable the enhancement of desired properties in plastics and thereby help the E&E industry to become more efficient and successful. Extending the lifetime of plastic and increasing its resistance to external influences and damage allows less maintenance, better service life and avoid downtimes.

Secure power transmissions

To guarantee safe and secure power transmission for society's increasing energy demand, medium and high voltage cables need to be covered by resistant plastic that maintains its dielectric and mechanical properties throughout its lifetime. BASF conducted a study with its Irgastab® Cable KV 10 product and a conventional antioxidant to compare dielectric capabilities, physical and thermal stability, and purity during manufacture.

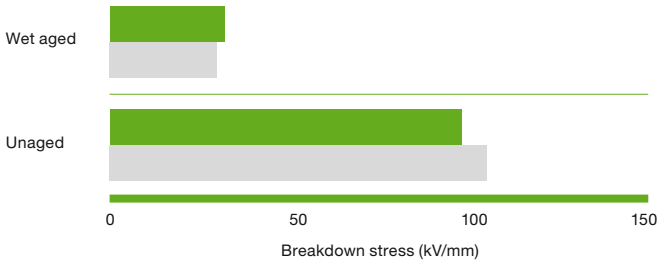
BASF could prove that the product that incorporated Irgastab® Cable KV 10 has a high breakdown stress index while unaged and performs on a level with the market reference when wet aged. This provided proof that dielectric properties are preserved, enabling a safe transmission of power. In addition, compared with the conventional antioxidant, Irgastab® Cable KV 10 shows higher stability to peroxides and thermal stress. While the standard antioxidant shows a clear reaction after 5 days at 60 °C, the solution with the BASF additive remains unchanged.

In the elongation-at-break test conducted, according to the IEC 811-1-1 standard, the material with 0.3% Irgastab® Cable KV 10 demonstrates higher performance when exposed to 135 °C temperature for 28 days. But BASF's proprietary additive also performs much better in the purity test, achieving higher purity than the comparative product, guaranteeing insulation consistency during the manufacturing of the cables. The study shows that Irgastab® Cable KV 10 meets strict industry standards and can also convince with its excellent performance.

The benefits of Irgastab® Cable KV 10:

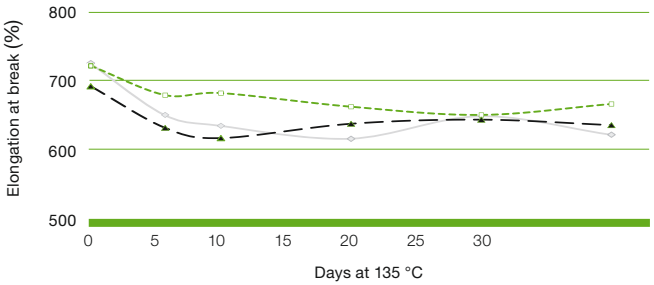
- Provides a high level of scorch protection during cable manufacturing
- Ensures high insulation consistency of produced cables, delivering safe and secure power transmission
- Excellent thermal stabilization
- Enables an outstanding degree of cross-linking between the peroxide agent and the polymer
- High purity

Irgastab® Cable KV 10 preserves the dielectric properties



- 0.2% AO TBM 6
- 0.2% Irgastab® Cable KV 10

Irgastab® Cable KV 10 provides long-term thermal stability of peroxide XLPE

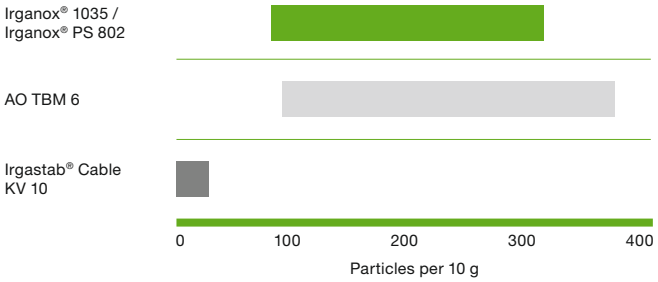


- 0.2% Irgastab® Cable KV 10
- 0.3% Irgastab® Cable KV 10
- 0.2% AO TBM 6

Measured according to IEC 811-1-1

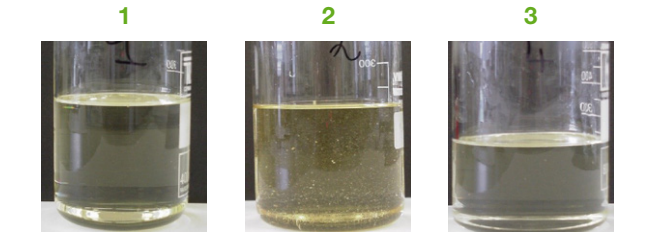
Irgastab® Cable KV 10 provides excellent mechanical performances and fulfill the industry standards: 75% retained elongation at break after 10 days at 150 °C.

Irgastab® Cable KV 10 achieves highest purity



10 g solved in 100 ml solvent and filtered through 0.45 micron paper filter; computer-controlled microscope from particles bigger than 50 microns.

Irgastab® Cable KV 10 and peroxides exhibit high stability over time



After mixing at 60 °C

After 5 days at 60 °C

Stability with DCP (1:10)

(1) Irgastab® Cable KV 10
(2) AO TBM 6
(3) Irganox® 1035: Irganox® PS 802: 1:1

Irgastab® Cable KV 10 does not interfere with the peroxide agent under cross-linking process conditions

Innovative plastic additives for **energy efficiency, durability, UV light and thermal stabilization**, antistatic properties, and flame retardancy.

Recommended additives for the electrical & electronics industry

BENEFIT	Polyamides for connectors	PET/PBT for connectors, solar panels, frames	PC for housings and frames	POM for a variety of parts	HDPE for power cable jackets	LDPE for power cable insulation	Elastomers for jackets	TPU for jackets	PVC for jackets	PP, LDPE for low-voltage cable insulation and jackets
PS & LTTS	Irganox® 1098 Irganox® B 1171	Irgafos® 126 Irgafos® 168 Irganox® 245 Irganox® 1010 Irganox® B 561	Irgafos® 168 Irganox® B 900	Irganox® 245 Irganox® 259 Irganox® 1010	Irganox® B-blends	Irganox® B-blends Irgastab® Cable KV 10	Irganox® 565 Irganox® 1098 Irgastab® Cable KV 10	Irgafos® 168 Irganox® 245 Irganox® 1010 Irganox® 1098	Irganox® 1010 Irganox® 1076	Irganox® B-blends
Light stabilizers	Chimassorb® 2020 Tinuvin® 234 Tinuvin® 312 Uvinul® 4050	Tinuvin® 234 Tinuvin® 622 Tinuvin® 1577	Tinuvin® 234 Tinuvin® 329 Tinuvin® 360 Tinuvin® 1577 Uvinul® 3030	Tinuvin® PA 144 Tinuvin® 234 Tinuvin® 622 Tinuvin® 770	Chimassorb® 2020 Tinuvin® 622		Chimassorb® 2020 Tinuvin® 234 Tinuvin® 622 Tinuvin® 770 Uvinul® 3035 Uvinul® 4050	Chimassorb® 81 Tinuvin® 571 Tinuvin® 622	Chimassorb® 81 Tinuvin® XT 835	Chimassorb® 2020 Tinuvin® 622 Uvinul® 4050
Specialties	Irgastat® P Melapur® MC Melapur® 200 Tinopal® OB	Irgastat® P Melapur® 200 Tinopal® OB		Irgastat® P Tinopal® OB	Irganox® MD 1024			Tinopal® OB		Irganox® MD 1024

BENEFIT	EVA in encapsulants	PET in backsheet films	PA/PBT in electrical components	PET/PBT/PA in frames	ABS in consumer electronics	PC/ABS in consumer electronics	PS, HIPS in appliances, white goods	PC in components	PA in power tools	PP in small appliances	PBT/PET in components
PS & LTTS	Irganox® 1010 Irganox® 1076 Irgastab® FS 301	Irgafos® 126 Irgafos® 168 Irganox® 1010 Irganox® B 561	Irgafos® 126 Irganox® 245 Irganox® 1098 Irganox® B 1171	Irgafos® 126 Irgafos® 168 Irganox® B 1171 Irganox® B 215	Irganox® 1076 Irganox® 245 Irganox® B 900 Irganox® PS 800	Irgafos® 168 Irganox® 245 Irganox® 1076	Irganox® 245 Irganox® 1076 Irganox® B 900	Irgafos® 168 Irganox® B 900	Irganox® 245 Irganox® 1098 Irganox® B 1171	Irganox® B 215 Irganox® B 225 Irganox® PS 802	Irgafos® 126 Irgafos® 168 Irganox® 245 Irganox® 1010
Light stabilizers	Chimassorb® 81 Tinuvin® 622 Tinuvin® 770	Tinuvin® 1577 Tinuvin® 1600	Chimassorb® 2020 Tinuvin® 234 Tinuvin® 770 Uvinul® 4050	Tinuvin® 234 Tinuvin® 622 Tinuvin® 770 Tinuvin® 1577 Uvinul® 4050	Tinuvin® 234 Tinuvin® 770 Tinuvin® P Uvinul® 4050	Tinuvin® 234	Tinuvin® 234 Tinuvin® P Uvinul® 4050	Tinuvin® 234 Tinuvin® 329	Tinuvin® 234, Tinuvin® 770 Uvinul® 4050	Chimassorb® 2020 Tinuvin® 783 Tinuvin® 791	Tinuvin® 234 Tinuvin® 622 Tinuvin® 1577
Specialties			Melapur® 200 Melapur® MC		Irgastat® P Tinopal® OB			Tinopal® OB	Melapur® 200 Melapur® MC	Irgaclear® XT Irgastab® NA Irgastat® P Tinopal® OB	Melapur® 200

Terminology

ABS	Acrylonitrile Butadienestyrene
EBA	Ethylene Butyl Acrylate
EVA	Ethylene-Vinyl Acetate
HDPE	High-Density Polyethylene
HIPS	High-Impact Polystyrene
LDPE	Low-Density Polyethylene
LLDPE	Linear Low-Density Polyethylene
LS	Light Stabilizer
LTTS	Long-Term Thermal Stabilizer
PA	Polyamide
PBT	Polybutylene Terephtalate
PC	Polycarbonate
PE	Polyethylene
PES	Polyester
PET	Polyethylene Terephthalate
PMMA	Polymethylmethacrylate
PO	Polyolefin
POM	Polyoxymethylene
PP	Polypropylene
PS	Polystyrene
PS	Process Stabilizer
PU	Polyurethane
PVB	Polyvinylbutyral
PVC	Polyvinyl Chloride
TPO	Thermoplastic Polyolefin
TPU	Thermoplastic Polyurethane
UVA	UV Absorber

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